Engineers Australia

Engineering Heritage Victoria

Nomination for Recognition

Engineering Heritage Australia Recognition Program

Bairnsdale to Orbost Railway

May 2016

CAPTION FOR COVER PHOTOGRAPH

This shows the start of the Bairnsdale-Orbost Railway Line. The track in the middle of the photo is new as the Bairnsdale Station still remains in operation. The older track can be seen on the left side of the photo together with the old goods shed.

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1. Introduction

Overview

The 1850s was the start of an era for the Victoria Railways, as they made their introduction into the construction of various significant railways. In 1858, the construction of a railway lines from Melbourne to Bendigo and from Geelong to Ballarat started to serve the flourishing population in the goldfields regions. These services would also serve farmers, major businesses and residents along these new lines and in the goldfields.

From the 1850s, coastal ports were used by the settlers in the East of East Gippsland. However, the use for these ports became less as the settlers started to move into the river valleys further from the coast. The rapid growth of the population in the new settlement areas resulted in a demand for the construction of a railway line in order to move their goods which included timber, maize, stock and daily produce to the Melbourne market. Construction of the railway began from Oakleigh in 1871. Later, it was extended up to Morwell in 1877 and Bairnsdale in 1888 which became one of the busiest stations beyond Dandenong.

There were problems with the approval of the railway line between Bairnsdale and Orbost, specifically the cost. The Railways Standing Committee recommended the construction of the railway line form Bairnsdale to Bruthen then on to Orbost having a length of 60 miles (97 km) at an estimated cost of £391,360. The construction of the Bairnsdale to Orbost railway line started in 1912 and was opened to the public on the 10 of April, 1916 [1] [2].

One major obstacle in constructing the railway line was the nature of the land. Since it is characterised as being hilly, it was estimated that large volumes of earthworks was needed. Amendments of plans were made in order to minimise the cost of the project. As a result of the rural conditions many of the initial designs for the bridges had to be modified [3].

This project was considered to be one of the most expensive undertaken by the Victorian Railways at the time and was led by Maurice E Kernot. The only remaining station left is the Bairnsdale station which remains in service today. Very little remains of the other stations as only sign boards can be seen at a few of the stations. However, most of the magnificent bridges constructed as part of the railway line remain. For example, the Nicholson Bridge was renovated and adapted as part of the East Gippsland Rail Trail [3].

[1] Marc Fiddian, 2011, *Citizens, Cargo and Coal*, A history of Gippsland Railway
[2] Engineering Heritage Australia, 2014, *Catching A Train from Orbost* , Vol. 1, No. 5
[3] Maurice Edwin Kernot, 1917, *Bairnsdale to Orbost Railway*

2. Heritage Award Nomination Letter

Name of work: Bairnsdale to Orbost Railway

The above mentioned work is nominated to be awarded recognition under the terms of the Engineering Heritage Australia Heritage Recognition Program.

Location: Between two major towns of Bairnsdale and Orbost. The total distance of the railway line is 60 miles (95.56 km) and the grid references are listed below:

Bairnsdale:

Coordinates: 37.8288°S, 147.6276°E

Orbost Station:

Coordinates: 37.7175°S, 147.4512°E

Owner (Name & Address): Originally owned and maintained by Victorian Railways, now owned by the Victorian Government under the responsibility of Department of Environment Lands Water and Planning (DWEWP) but without budget for maintenance. Maintenance is performed by the volunteer community group which operates the East Gippsland Rail Trail.

Access to site: Most of the bridges have been fenced off and signs have been placed warning people of the dangers of entering, with the exception of Nicholson River that has been utilised as part of the East Gippsland Rail Trail pathway.

Nominating Body: Engineering Heritage Victoria

David LeLievre
Chair
Engineering Heritage Victoria
Date: 3 May 2016

3. Heritage Assessment

3.1. Basic Data

Item Name: Bairnsdale to Orbost Railway

3.1.1. Other/Former Names

Can be referred to as Orbost Railway Line or East Gippsland Railway Line.

3.1.2. Location

From Bairnsdale Railway Station, Victoria to Orbost Railway Station Victoria including both stations, and other infrastructure located along the route such as bridges and other stations

Major stations/locations were:

Bairnsdale Station [4]

(37.8288°S, 147.6276°E)

Nicholson Station [4]

(37.8138°S, 147.7366°E)

Bumberrah Station [4]

(37.7933°S, 147.8288°E)

Mossiface Station [4]

(37.7338°S, 147.8103°E)

Bruthen Station [4]

(37.7059°S, 147.8216°E)

Colquhoun Station [4]

(37.7586°S, 147.9470°E)

Nowa Nowa Station [4]

(37.7293°S, 148.0963°E)

Tostaree Station [4]

(37.7475°S, 148.1785°E)

Waygara Station [4]

(37.7399°S, 148.3165°E)

Orbost Station [4]

(37.7175°S, 148.4512°E)

Major Structures along the route:

Mitchell River Bridge [5]

(37.825581°S, 147.641147°E)

Nicholson River Bridge [5]

(37.813261°S, 147.739483°E)

[4] VICSIG, Infrastructure, http://vicsig.net/infrastructure/line/orbost

Tambo River Bridge [5]

(37.710956°S, 147.832883°E)

Stony Creek Trestle Bridge [5]

(37.743344°S, 148.044953°E)

Snowy River Flood Plain Bridges [5]

(37.726308°S, 148.445294°E)

3.1.3. Address

The distance between the two major towns Bairnsdale to Orbost is 55.6 miles. [5]

The grid references of the most significant locations are:

Bairnsdale Station [5]

(-37.8288°, 147.6276°)

Bruthen Station [5]

(-37.7059°, 147.8216°)

Stony Creek Trestle Bridge [5]

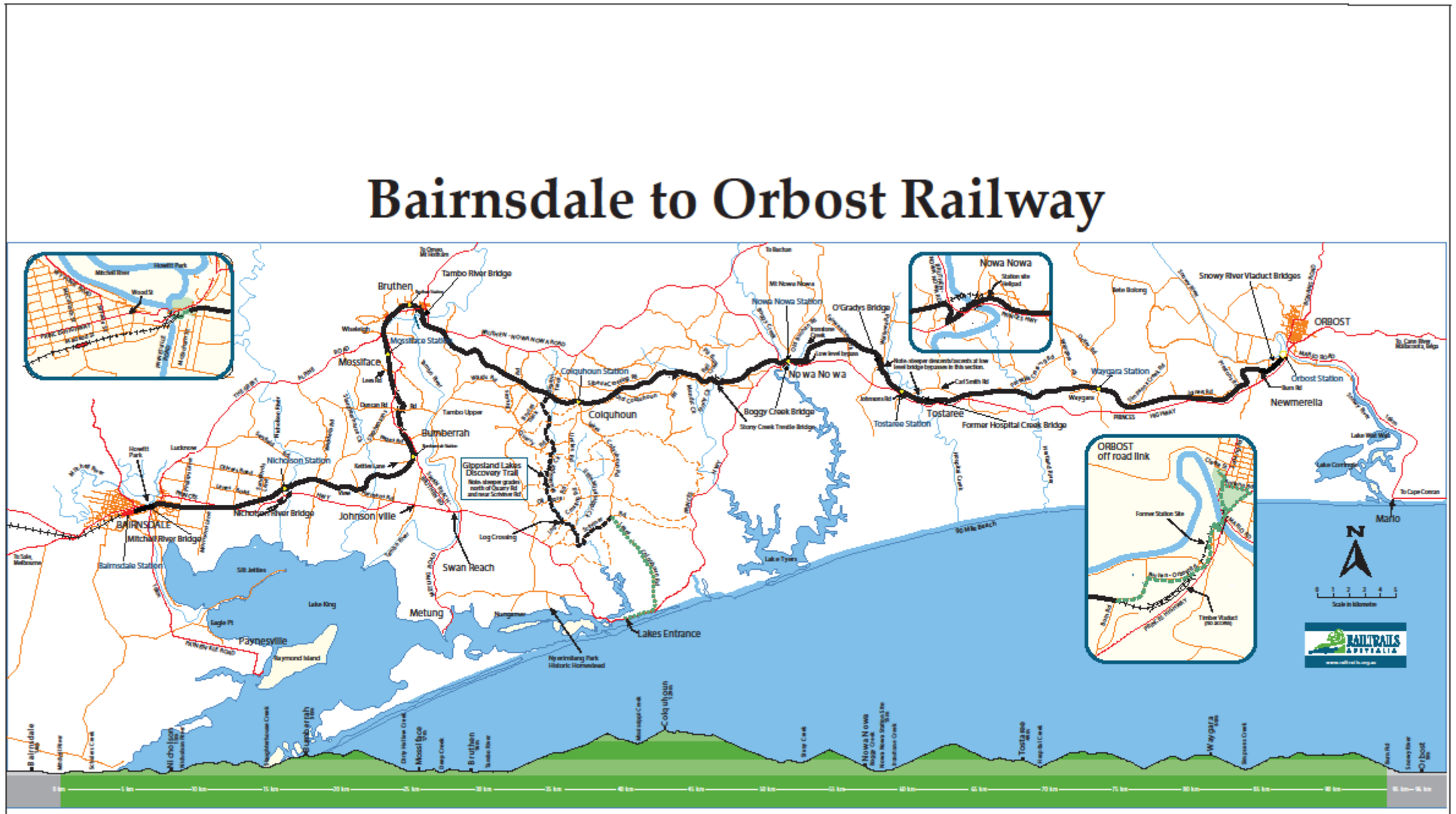
(37°44'36.04"S, 148° 2'41.83"E)

Orbost Station [5]

(-37.7175°, 148.4512°)

[5] Google Earth

3.1.4. Map of Railway Line:



3.1.5. Suburb/Nearest Town: Bairnsdale to Orbost

3.1.6. State: Victoria

3.1.7. Local Govt. Areas covered by Bairnsdale to Orbost Railway: East Gippsland Shire Council

3.1.8 Owner (Name & Address): Originally owned and maintained by Victorian

Railways, now owned by the Victorian Government under the responsibility of Department of Environment Lands Water and Planning (DWEWP) but without budget for maintenance. Maintenance is performed by the volunteer community group which operates the Bairnsdale to Orbost Rail Trail.

3.1.9 Current Use: Closed

3.1.10 Former Use: Railway Line

3.1.11 Designer: Maurice Edwin Kernot, Chief Engineer

3.1.12 Maker/Builder: Victorian Railways

3.1.13 Year Started: 1912

3.1.14 Year Completed: 1916

3.1.15 Physical Description:

The map of the Railway line can be seen at clause 3.1.4.

The length of the line is about 60 miles or 96 km [3]

Major features of the railway line [3]

- The amount of earthwork involved was estimated to be 2,000,000 cubic yards (1,529,110 cubic metres) [3]
- Mitchell, Nicholson and Tambo Rivers were crossed by permanent bridges [3]
- The line has been constructed with 60lb. (pounds/yard)[6] steel rails and track [3]
- A ruling grade of 1:50 was used throughout [3]
- Sleepers were cut from Ironbark, Yellow Stringy Bark and Mahogany Trees [7]

Most of the stations no longer exist, except for Bairnsdale Station which still remains operational and there are minimal remains at Bruthen and Orbost Stations. Some of the bridges were damaged or destroyed by bushfire and flood, however the three permanent bridges still remains intact wherein one of them which is the Nicholson River Bridge was adopted as part of the East Gippsland Rail Trail.

3.1.16 Physical Condition

Bairnsdale Station appears to be in good condition due to still being used.

The rails, sleepers and other stations have been largely removed. The permanent bridges and earthworks remain intact. The condition of the bridges is as follows: the permanent bridges appear to be in good condition however lack of maintenance can be observed due to it not being used. Rust can

[6] The metric equivalent of 60 pounds/yard is 29.76 kg/metre

[7] Deborah Hall 2002, *In times Gone by Orbost on the Snowy River*

be seen on the beams of the bridges which appear to be imported from England and made by Dorman Long. Erosion can be observed at the foundation of the Mitchell River Bridge, it shows different sized aggregates used for the foundation. The Stony Creek Trestle Bridge remains intact however deterioration can be observed on the wooden deck on top of the bridge which resulted from the lack of maintenance. The Snowy River Flood Plain bridges also remain intact but damage can be observed. The longer trestle section has beer has been repaired with steel in place of timber members. The piers of the permanent bridges are made of timber and are susceptible to fire, the surrounding vegetation has been regularly maintained to prevent potential future damage.

3.1.17 Modification and Dates

All the stations along the railway have been closed except for Bairnsdale which is still in service. In some cases the old station buildings have been destroyed or removed, for instance Orbost. This is according to the Site Visit observations. Further information about the stations can be found in Appendix 1 .

The Victorian Railway Board had improved the Bairnsdale-Orbost's passenger service by replacing old seats with 14 comfortable luxury seats in 1935 [8].

In 1957, diesel locomotives replaced steam locomotives on the line [1].

There was some major maintenance required as well as minor repairs along the railway due to natural disasters such as bushfires and floods. For example, timber abutments were replaced with concrete at Snowy River Floodplain's abutments in 1971, also timber joists were replaced with steel due to flood damages [1].

The Stony Creek Trestle Bridge remained in service until a bushfire damaged the structure in 1980 [1].

The railway closed in August 1987 and some of the railway infrastructure was dismantled in 1994 [27].

Hospital Creek Bridge was destroyed by bushfire in February 2011 [9].

The Rail Trail was opened from Bairndale to Nowa Nowa. It was completed with a 35 kilometre extension from Nowa Nowa to Orbost on January 28, 2006 [9].

The figure below shows one of the piers that was replaced on the longer of the Snowy River Floodplain bridges in 1966 it represents the level of maintenance and amount of upkeep needed throughout its useful lifetime, this is based on Site Visit observation.

[8] Orbost-Bairnsdale Railway information Panel at Orbost

[9] Rail Trails Australia, East Gippsland Rail Trail
https://www.railtrails.org.au/component/railtrails/?view=trail&id=143&Itemid=66

Figure 1: Marking on pier showing replacement date

3.1.18 Historical Notes

The table below demonstrates the history of railway briefly [10].

Proposed	1877
Preliminary Proposal	1908
Construction commenced	1912
Completed	1916
Closed	1987

Preliminary Proposal 1908

Orbost and East Gippsland Railway League had proposed a railway extension through East Gippsland in 1908, which aimed to develop an isolated part of the country. At the time, construction of a railway could be considered a beneficial investment for the country as it could increase the population in the region. The proposed railway length in 1908 was about 140 miles and the cost was estimated £800,000. The line was proposed to proceed from Bairnsdale by way of the Lower Nicholson to Bruthen. "After crossing the Tambo River, it would be carried to near Nowa Nowa; the head of Lake Tyers, forward to Orbost. From Orbost it would proceed in a north-easterly way to the New South Wales border. There were different suggested routes between Orbost and the New South Wales border, the first was through Bendoc, another by the Cann River and another which is located between these two. The distances between critical locations are tabulated below". [11]

The railway was mostly used for transferring goods such as timber, stock, maize and dairy produces.

[10] OMICS International. Orbost Railway Line. No date. Viewed 12 of December 2015. http://research.omicsgroup.org/index.php/Orbost_railway_line.

[11] Orbost and East Gippsland Railway League. Railway Extension through East Gippsland, Gippsland, Victoria. 1908.

The table below shows the distances from Bairnsdale to crucial points along the railway.[3]

Bruthen	16 miles
Nowa Nowa	32 miles
Snowy River Crossing, four miles above Orbost	58 miles
Orbost	62 miles
Brodribb River	68 miles
Cabbage Tree Creek	77 miles
Bell Bird Creek	84 miles
McKenzie River	89 miles
Bemm River, 2.5 miles south of Club Terrace Township	94 miles
Tonghi Creek	105 miles
Cann River	111 miles
New South Wales border	135 miles

Constructing this railway had potential advantages. Firstly, the proposed railway would connect Victoria to New South Wales. Also, it would increase the population in this isolated area as well as provide occupation and home for thousands of people. Secondly, it could have provided an alternative route between Melbourne and Sydney with a better climate condition comparing to the inland route via Albury and created a tourist attraction for the country. Also, it could have improved the trade in Victoria and also develop the mining [industry] by constructing a new railway in one of the largest mineral resources in Australia. Lastly, the land values along the line would increase and the government could sell the public lands and gain some benefits [11].

The importance of the railway can be realised by looking at the proposal conclusion that was issued by the Orbost and East Gippsland Railway League; the below paragraph is quoted from the proposal. Figure 2 illustrates the proposed railway. [10]

"It is somewhat surprising that Victoria and New South Wales should have allowed such a valuable territory, comprising about 20,000 square miles, to have remained so long in an almost virgin state. Such a railway as that proposed would find occupation for a large population, immensely increase the output of livestock and agricultural products, enlarge the facilities for inter-State trade and national defence, and materially enhance the welfare of the people and the national revenue and wealth" [10].

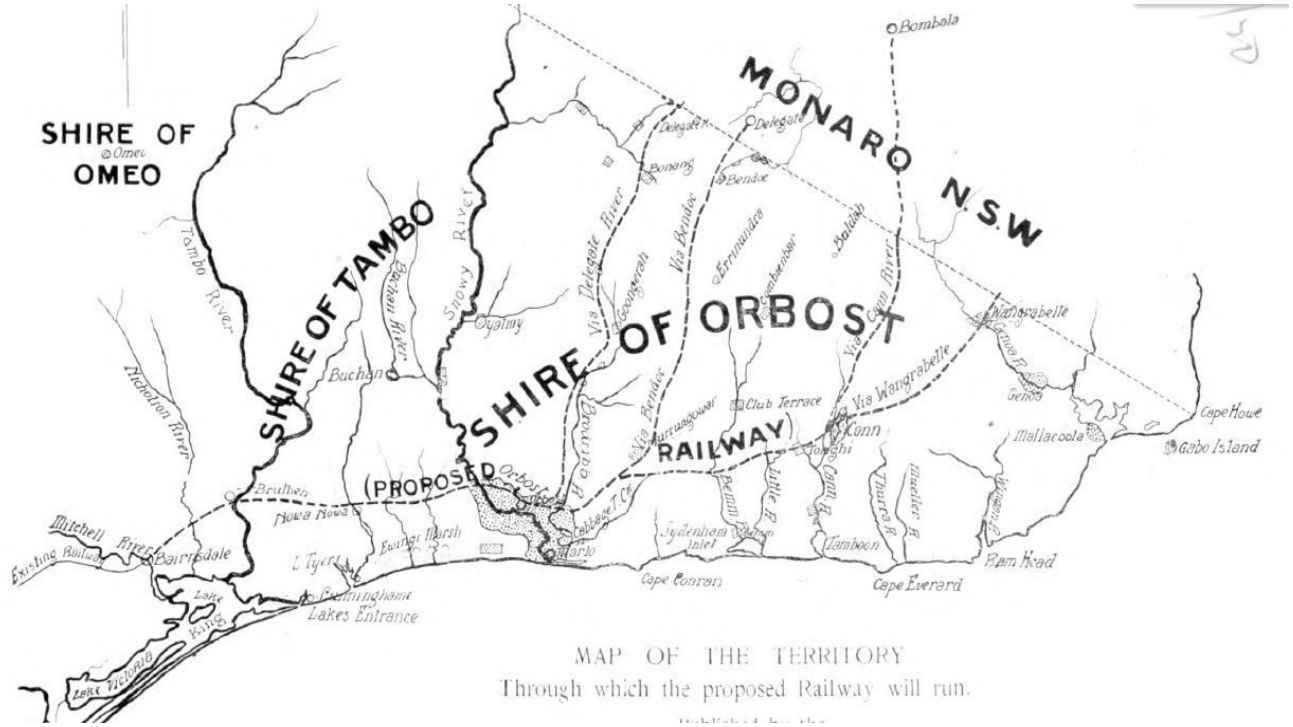


Figure 2: Map of the proposed railway outlining the neighbouring towns and rivers

Competed Railway 1916

After a long discussion, only a part of proposed East Gippsland line was completed in 1916. The main reasons for this decision would be the wild and steep conditions of Eastern Victoria and also lack of population in the region. Therefore, the railway has not been connected to New South Wales. There is a 120 kilometres of rural land from Orbost station to Bombala (New South Wales) that has no rail line connection, this is demonstrated in Figure 3 [3].

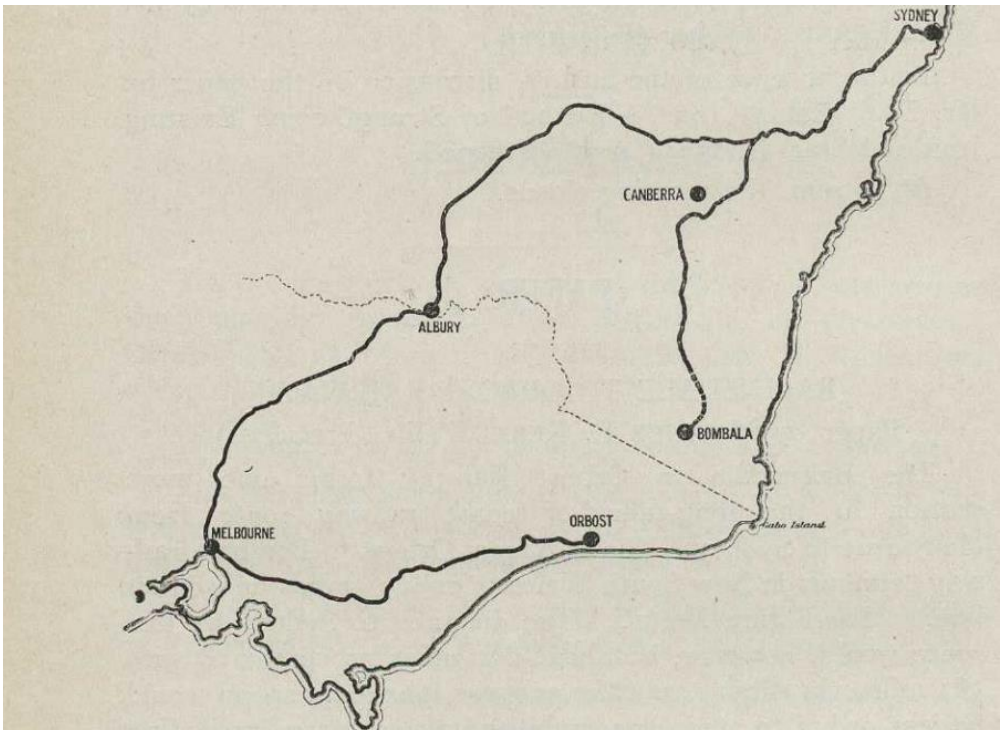


Figure 3: Visual of the significant distance between Orbost and Bombala

Locomotives & Rolling Stock

D3 class, K class and sometimes N class locomotives were generally used on the line. In 1957, a change was made to diesel wherein T and Y class locomotives were in service.

A rail motor which was used from 1924 – 1935, had the appearance of a motor bus on wheels. Passenger service was stopped in 1935 however, a special provision was made to attach a carriage to a goods van which was known as a car goods. It took considerable amount of coal to travel form Bairnsdale to Orbost and water was topped up at Bruthen and Nowa Nowa stations[1].

Figure 4: Water Tank at Nowa Nowa Station [1]

Dieselisation saw T and sometimes Y class diesels in use, often double heading on the timber trains out of Orbost [1]. Thirty timber wagons were specially built for the carriage of timber between Orbost and Westall. They were sixty-seven feet long and each would carry 42 tons of timber. In later years, a smaller wagon was interspersed between these giants to spread the load on the ageing trestle bridges [7].

Staffing and Operations

The main use for the Orbost Section of the Gippsland Line is for freight. The produce transported were potatoes, maize, beans and butter and cheese from a local butter factory. 100-200 boxes of fish were transported every Monday from Orbost. 20 trucks would be loaded with cattle to be taken elsewhere [1].

In order to build up the steam pressure needed to move the steam engine, drivers had to be at the Orbost Engine shed at 4 am to light the fire under the boiler. The train would leave Orbost at around 8 am and takes about 75 minutes to reach Nowa Nowa. After another 75 minutes, the train would stop at Bruthen where the crew was changed. The driver and firemen would then switch from the train coming from Bairnsdale to Orbost. It could be noon before they left Bruthen if this train was late and would later arrive at Orbost in mid–afternoon [1].

In July 1, 1926 it was announce that the country trains running late would not be able to stop at scheduled refreshment rooms. In these cases conductors would take orders from the passengers such

as lunch cartons containing sandwiches, cake and fruit. This information would then be telegraphed on the next refreshment rooms and the conductor would deliver the order to the passengers[1].

In October 1926 the rail motor service introduced from Bairnsdale to Orbost in May 1924 was in danger of being abandoned. The Victorian Railways Commissioners stated that patronage had not been satisfactory despite a one and a half hours reduced for the travel time. The timetables for the passenger train are shown in Figure 5-7. The decrease in the amount of passengers for Bairnsdale and Orbost Station is shown in Figure 8.

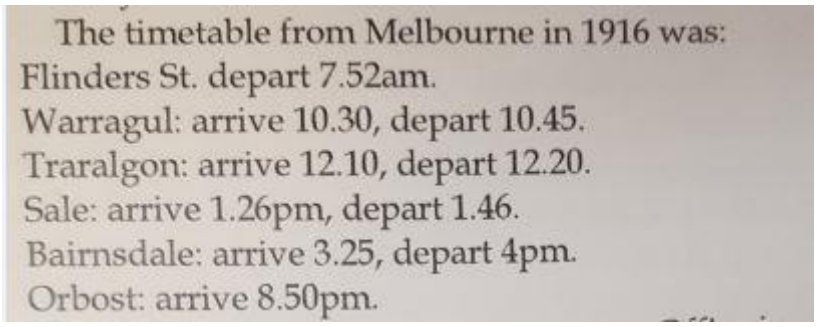

The timetable from Melbourne in 1916 was:
Flinders St. depart 7.52am.
Warragul: arrive 10.30, depart 10.45.
Traralgon: arrive 12.10, depart 12.20.
Sale: arrive 1.26pm, depart 1.46.
Bairnsdale: arrive 3.25, depart 4pm.
Orbost: arrive 8.50pm.

Figure 5: Timetable in 1916[1]


Tuesday/Wednesday/Thursday
Leave Flinders St 7.40am
Arrive Bairnsdale 3.25pm
Depart Bairnsdale 3.45pm
Arrive Orbost 6.50pm
Monday/Friday/Saturday
Leave Flinders St 8.38am
Arrive Bairnsdale 3.25pm
Depart Bairnsdale 3.45pm
Arrive Orbost 6.50pm

Figure 6: Timetable in 1916[1]

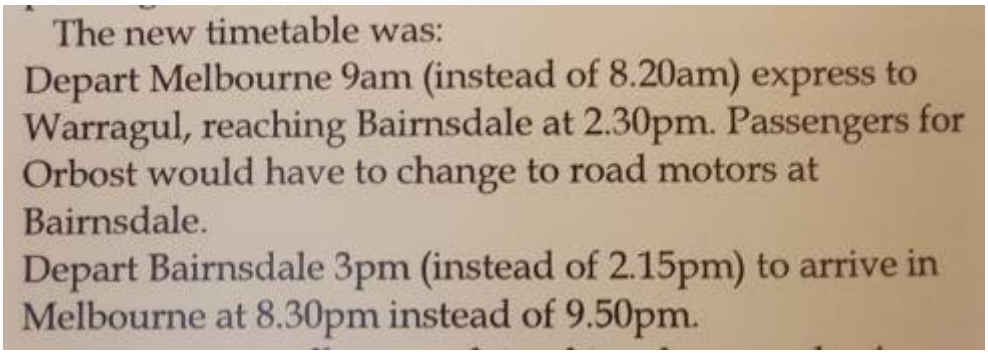

The new timetable was:
Depart Melbourne 9am (instead of 8.20am) express to Warragul, reaching Bairnsdale at 2.30pm. Passengers for Orbost would have to change to road motors at Bairnsdale.
Depart Bairnsdale 3pm (instead of 2.15pm) to arrive in Melbourne at 8.30pm instead of 9.50pm.

Figure 7 - Timetable in 1935[1]

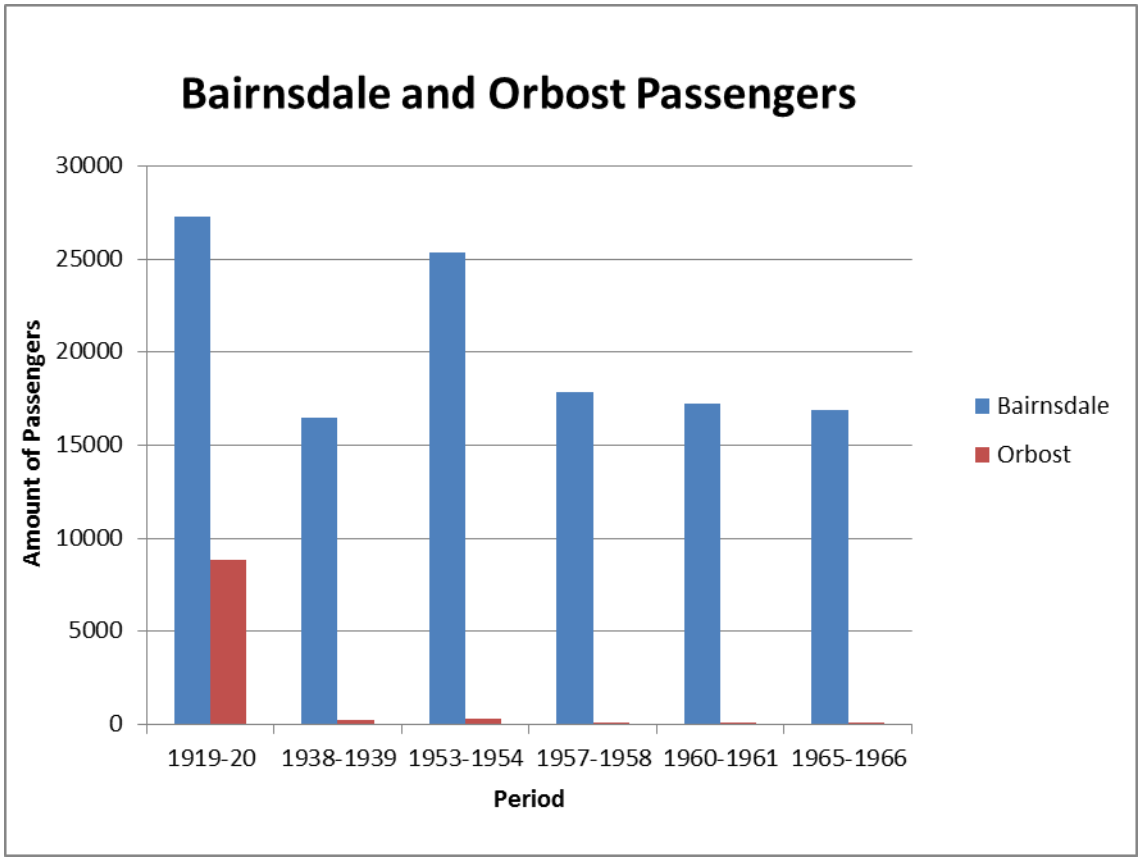


Figure 8 - Decrease in the amount of Passengers[1]

"Ted McNamara, who joined the railways in 1942, worked as a fireman on the steam locomotives from 1948 to 1965. For rail buffs, he mentioned that mostly D3 and K class locos were used on the line, but on occasion an N class would be seen. Generally five tons of coal were used on the trip between Orbost and Bairnsdale, and they topped up with water at Nowa Nowa and Bruhen. Sometimes if coal was running short, extra fuel in the form of wood would be taken on at Nowa Nowa" [7].

The last train to ever run on the Bairnsdale to Orbost Railway line was on August 1987. "Quite a good crowd of locals and visitors turned up at the Orbost Railway Station on Friday 21 August, 1987 to see the last train leave at 4:45 pm, under the control of driver Bill Buckley. Ron Hayward, who drove the first diesel into Orbost was there to see the end of an era. Driver Don Johns, was the last man who drove the last goods train into Orbost on the morning of 21 August 1987" [7].

Source of Rail

The documents regarding which steel mill produced the rail for the Bairnsdale to Orbost Railway Line were researched extensively. However, this information was not obtained.

The railway line project took place at a time in history where the normal supply-chain for the Victorian Railways was in a state of flux.

Broken Hill Proprietary (BHP), at Newcastle Steelworks, had installed a rail making mill [12] and the first rail was produced in 1915. Newcastle Industrial Heritage Association states that by "27 August 1915 a

[12] Armstrong, John. Shaping the Hunter. Newcastle Division of the Institution of Engineers, Australia. 1983. page 148.

total of 11.574 tons of rail had been produced". BHP was committed to produce rail for the Transcontinental Railway (Kalgoorlie to Port Augusta) and clearly this tied up their rail production capacity in 1915. The Trans Continental Railway was commenced in 1912 and the rails met in the middle of the Nullarbor Plain on 17 October 1917. By 1916 the bulk of the rail for the Bairnsdale to Orbost Railway would have been delivered so that it is unlikely that BHP would have been able to provide steel for the Bairnsdale to Orbost Railway. There was no other rail manufacturer in Australia at that time.

At the same time, steel mills in Europe would have been focusing on war productions and furthermore it was not possible to purchase steel from Germany as it was the enemy during the First World War. Germany had been the traditional supplier of steel and other products to Australia before the War.

This would have left United States of America as the most likely supplier of rail for the Bairnsdale to Orbost Railway. The United states were neutral in the early years of First World War.

Looking for manufacturer's branding on rail in the Bairnsdale to Orbost Railway is now very difficult as the vast majority of the rail has been recovered and probably sold as scrap. In fact, although you can't tell, there might be steel from this railway in your Toyota, Ford or Holden!

During the Site Visit, the few pieces of rail found are deeply embedded in roadways with only the top of the running surface showing. Their manufacturing stamps are therefore not visible. However, Figures 9 and 10 show the manufacturers' marks on the rails found which was used as columns for the foot path bridge located on the Rail Trail in Bruthen. These images show that the Lorain Steel Co. was the manufacturer of the rail.

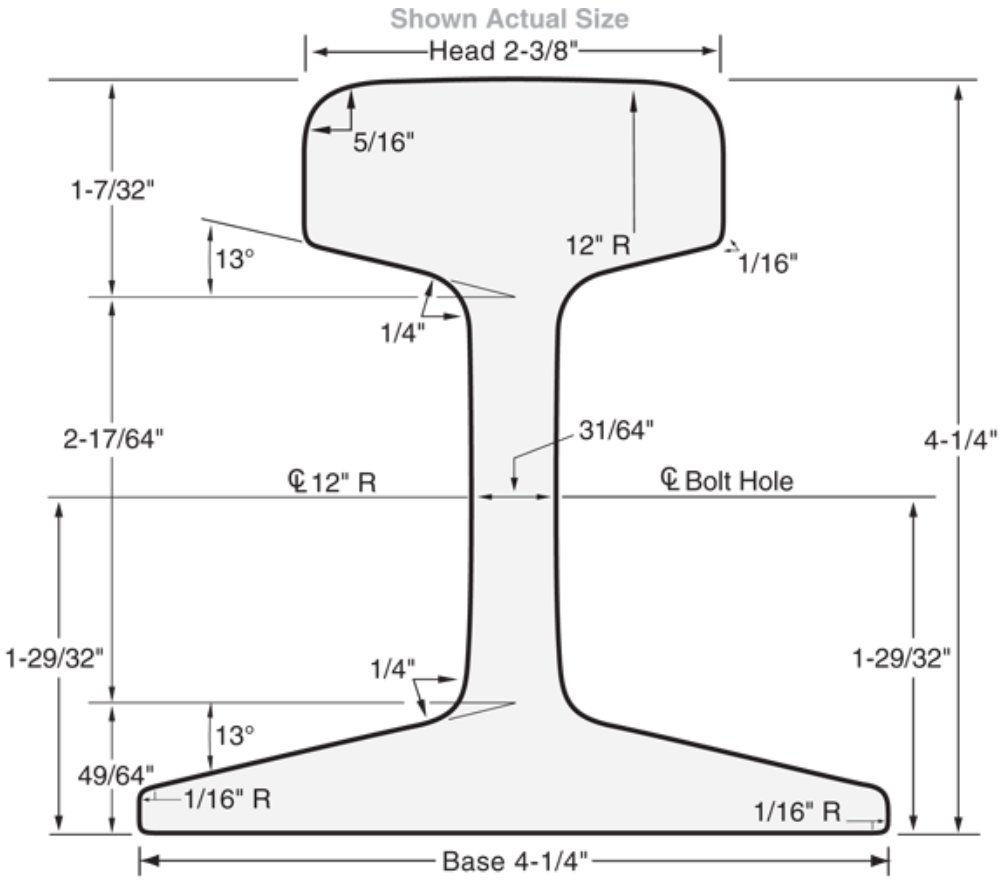
Figure 9 - Lorain Steel Co. (December 2015 Photography: Joemar Pajar)

Figure 10 - Rail found in Bruthen (December 2015 Photography: Joemar Pajar)

According to Randy Whittle, "In 1905, Lorain Steel was installing street rail systems in Glasgow, Scotland; Cape Town, South Africa; Montevideo, Uruguay; London, England; Melbourne and Sydney, Australia; and Tokyo, Japan" [13]. Lorain Steel Co was a steel corporation in Ohio, United States of America. It used to be known as the "Johnson Company Mill" and became a dominant provider for US communities and started supplying worldwide.

These clues certainly support the hypothesis that Victorian Railways were purchasing rail form the USA not long before the Bairnsdale to Orbost Railway was built".

[13] Whittle R. Johnstown Pennsylvania *1895-1936.2005.*



Rail Type:	60 AS
Section Number:	6040
Nominal Weight:	60 lbs/yd
Standard Length:	20', 30', 33', & 40'
Standard Drilling:	2-1/2" X 5" with 15/16" dia. holes
Splice Bar Length:	20"
Splice Bar Weight:	13 lbs/pr **with hardware:** 16 lbs/pr
Track Bolt:	3/4" X 4"

Area in^2: 5.93
Section Modulus in^3:
Head: 6.62
Base: 7.10
Moment of Inertia in^4: 14.56

Figure 11 - Cross Section of Rail (Supplied by Owen Peke)

1931 Bairnsdale to Orbost Non-Beneficial Railway Line

In 1931, parliament requested the Parliamentary Standing Committee on Railways to provide a report on the Bairnsdale to Orbost railway to discuss any changes and improvements that might develop trades and increase the benefits of the railway. This report stated that the railway was not beneficial and Figure 12 compares the expenses and revenues from 1916 to 1931. Country passenger rate during 1928-29 decreased by 20% compared to 1922-23, despite the increase in the population during this period. The main reason for decreasing the passenger traffic was because there was a significant rise in the number motor vehicles used in Victoria, which was almost 7 times more in 1923 compare to 1918 [14].

Bairnsdale-Orbost : 60.24 *miles. Construction Cost per mile*, £7,478 ; *total*, £450,460.
Estimated Loss for First Year, £5,725.

Year Ending 28th February—	Loss.	Revenue.	Working Expenses.	Interest Charge.	Traffic Train Miles.
	£	£	£	£	
*1918 ..	8,931 ..	11,071 ..	7,939 ..	12,063 ..	24,082
1919 ..	15,398 ..	17,141 ..	14,234 ..	18,305 ..	39,440
1920 ..	15,848 ..	16,774 ..	14,363 ..	18,259 ..	37,360
1921 ..	12,249 ..	23,028 ..	16,905 ..	18,372 ..	38,942
1922 ..	8,782 ..	30,976 ..	21,111 ..	18,647 ..	42,455
1923 ..	10,491 ..	30,951 ..	22,812 ..	18,630 ..	42,137
1924 ..	9,045 ..	32,624 ..	22,958 ..	18,711 ..	42,982
1925 ..	9,390 ..	35,301 ..	26,060 ..	18,631 ..	72,383
1926 ..	16,884 ..	31,306 ..	29,321 ..	18,869 ..	78,385
1927 ..	21,483 ..	28,904 ..	31,384 ..	19,003 ..	79,468
1928 ..	23,662 ..	30,634 ..	35,272 ..	19,024 ..	77,226
1929 ..	18,036 ..	29,632 ..	28,532 ..	19,136 ..	71,841
1930 ..	24,202 ..	28,389 ..	29,684 ..	22,907 ..	70,972
1931 ..	22,241 ..	26,266 ..	25,407 ..	23,100 ..	49,550
Total for period	207,711 ..	361,926 ..	318,043 ..	251,594 ..	743,141
Annual average	15,978 ..	27,840 ..	24,465 ..	19,353 ..	57,165

* The 1918 period was for eight months only, and is not included in the annual average.

Figure 12 Comparison of Expences and Revenue Bairndale-Orbost Rialway 1918-1981 [14]

Coal Shortage 1940s

There was a serious coal shortage during the 1940s that caused issues for rail lines across the Australia. Passenger transportations and goods transfer reduced by 50 percent and many train services were restricted or cancelled in September, 1943. This situation continued in the year after until October, the coal shortage was resolved by the end of January, 1944. The shortage in the 1940s affected all Victorian train services as well as the Bairnsdale to Orbost line, train passengers experienced inconsistency in travel timetables [1].

[14] The Parliamentary Standing Committee on Railways. 1931.

Railway closure 1987

The lack of population in the region and low activity levels in trades using the line caused the line to be used rarely and also poor maintenance caused the line to deteriorate. Some sections of the line were restricted to 15 km/h due to the faults that had occurred along the railway. During this period the line was mostly used to carry timber from Orbost, Limestone and Nowa Nowa direct to Melbourne. Around 40 faults occurred before the line closure on Friday 20 of August 1987. It should be noted that the railway was recommended to close 7 years earlier by the Lonie Report [15] [16].

East Gippsland Rail Trail 1987- present

The track infrastructures was removed in 1994 and the railway was replaced by the East Gippsland Rail Trail a few years later and completed in 28 of January, 2006. Lack of maintenance was observed during the site visit; almost no major maintenance has been done on the railway after the closure in 1987. Most of the bridges need to be restored before they can be linked to the Rail Trail and enhance its useability. The statement below describes the Rail Trail route: "The East Gippsland Rail Trail starts at Howitt Park on the east bank of the Mitchell River at Bairnsdale, past farmland for 10 km to Nicholson (sealed surface) with its spectacular bridge over the river. Then 22 km on to Bruthen and across the Tambo River, up into the Colquhoun Forest end route to Nowa Nowa and Lake Tyers at the 59 km mark. The section east from Nowa Nowa to it's the final destination at Orbost on the iconic Snowy River occurred on 28 January 2006. This completes a nearly 100 km Rail Trail". The Rail Trail is a tourist destination and has significant impacts on the region economically and socially which is discussed in the social impacts section [27].

Major events and disasters during a century 1916-2016

1934-1971 Major floods

Due to conditions within the region, flooding can occur throughout the year in East Gippsland. Four major floods that occurred since the railway was constructed in 1916. These occurred in January 1934, May 1942, February 1971 and June 1978. They have caused damage to East Gippsland infrastructure including the railway. For instance, the flood in 1971 caused some damage to the Snowy River Flood Plain Viaduct, which led to replacing concrete with timber in abutments and replacing damaged timber beams with steel joists [17].

A Dramatic Derailment in 1964

Steam locomotives were replaced by diesel locomotives in 1957. In 1964, a dramatic derailment took place. "A train of timber trucks being hauled by a diesel loco was derailed in which 11 trucks laden with timber came off the tracks causing 3 trucks to topple from the bridge and the other 8 toppled during the cleaning up of the site. Fortunately the locomotive and the guards van remained on the track and there were no injuries"[18].

[15] Transit News and Views. September 1987.

[16] The Victorian Transport Study. Lonie Report. Parliament of Victoria. 1980.

[17] East Gippsland Catchment Management Authority. River Rehabilitation Works. No date. Viewed on 12 December 2015.

[18] East Gippsland, Stony Creek Derailment. The Trail Mail, Winter Edition 2015.

1965 Bushfire

A significant bushfire occurred in Gippsland on 6 of March 1965, which damaged part of the railway enormously. The bushfire had burnt 3 railway bridges completely, between Bumberrah and Mossiface, as well as around 2000 sleepers and 7 kilometres of the railway telephone line. Repairs were completed after 8 days of railway closure [1].

2011 Bushfire

During a bushfire in East Gippsland in 2011, 8000 hectares had been burnt; a few houses and several sheds were destroyed. Hospital Creek Bridge did not survive and was completely destroyed on 1 February, 2011. Twisted metal remnants are the only remaining parts of the bridge which were found during the Site Visit [19].

[19] ABC News. Gippsland Bushfire Rages out of Control. 2011. Viewed 10 January 2016. http://www.abc.net.au/news/2011-02-02/gippsland-bushfire-rages-out-of-control/1926858.

3.1.19 Heritage Listings [20] [21]

Victoria Heritage Register.
Name: The Stony Creek Trestle Bridge
Location: Over Stony Creek around 5 kilometres south west of Nowa Nowa
VHR Number: H1436
National Trust File Number: B3484
National Trust Listing Date: 25/04/1974
Place ID: 891
Listing Date: not known

Victorian Heritage Inventory.
Name: Bairnsdale to Orbost Railway
Location: Bairnsdale to Orbost
Authority: East Gippsland Shire
Heritage Overlay Number: HO229
VHI Number: H8522-0003
Place ID: 11079
Listing Date: not known

Name: Bruthen Railway Bridge
Location: Burthen around 25 Kilometres from Bairnsdale. Bridge over Tambo River east of Bruthen
Authority: East Gippsland Shire
Heritage Overlay Number: HO229
VHI Number: H8422-0010
Place: 11044
Listing Date: not known

National Trust of Australia (Victoria)

Name: Nicholson Railway Bridge
Location: Adjacent to Princess Highway, Nicholson, East Gippsland Shire
National Trust File Number: B6946
Listing Date: 19/05/1998
Place ID: 67960

Name: The Boggy Creek Bridge
Location: Over Boggy Creek at Nowa Nowa
National Trust File Number: B6943
Listing Date: 15/09/1998
Place ID: 67883

Name: Wairewa Trestle Rail Bridge
Location: At Wairewa Road around 10 Kilometres to East of Nowa Nowa
Listing Date: 7/4/2016

[20] The National Trust data base
[21] Victorian Heritage data base

Place ID: 184810

Name: Hospital Creek No.1 Bridge
Location: Beside Princes Highway, East of Nowa Nowa, Gippsland Shire
National Trust File Number: B6947
Listing Date: 19/05/1998
Place ID: 67935
Note: Destroyed by fire February 2011.
Name: Snowy River Floodplain Railway Bridges
Location: west of Orbost, East Gippsland Shire
National Trust File Number: B6948
Listing Date: 19/05/1998
Place ID: 67991

4. Assessment of Significance

4.1 Historical Significance

The railway is historically significant. Firstly the railway provides a route for the isolated region in East Gippsland, this improved the trades and served passengers for more than seventy years. It was also intended to connect Victoria to New South Wales via the New South Wales railway that terminated at Bombala. Furthermore, the railway includes a number of unique and complex structures which were built during the First World War, during that time the country was experiencing difficult shortages of labour and material.

Secondly, the railway is a significant historical structure considering the rail bridges, some of which are rare or unique across the state. There are distinctive features about this railway which would indicate historical significance aspects of the railway such as the size of the project considering the amount of excavation and the wild condition of the region. The construction was one of the heaviest and most expensive railway extensions during its time. The complexity of the rail bridges and innovative techniques that were implemented around a century ago in the construction involved a substantial number of labourers and horses instead of machines.

Thirdly, railway is a good example of the early engineering skills and techniques in Australia. The railway is a significant part of East Gippsland as well as Victoria's history and heritage. It deserves to preserved and restored for the benefit of future generations.

4.2 Historic Individuals or Association

Refer to Appendix 6 for notes on Maurice E Kernot, James Cameron and Charles H Perrin

4.3 Creative or Technical Achievement

The main creative and technical achievements in this project were the complex bridge structures along the railway. Complexity, using composite materials and unique designs can be seen in the main substantial structures which are the bridge at Mitchell River, Nicholson Railway Bridge, the Stony Creek Trestle Bridge, the Boggy Creek, Hospital Creek Bridge and Snowy River Floodplain Viaducts. The technical aspects of each of above structures are discussed in Appendix 2. A good example of creativity was using innovative fastening techniques introduced by Victorian Railways Chief Engineer M E Kernot that aim to avoid damage from spiking and to enhance bridge life during Hospital Creek bridge construction [3].

It was evident in the preliminary tender for this project that the approximate amount of Earthworks necessary for the construction would be 2,000,000 cubic yards (1,529,110 cubic metres). Being such a large quantity of displacement, initially it was advised to use heavy plant machinery such as steam shovels. During the construction process, experience from other railways being constructed in other states was used in determining the most feasible outcome. As mentioned by Kernot, the most practical way was to incorporate Earth Wagons and horse and tip drays, as the cost of transport for the steam shovel to the site was extremely large and the "overhead charge" would be so large that funds would be insufficient to do payable work". The American Grader being one of the dominant utilities of that era, was sent to Bairnsdale and started work there, however, due to the wet weather conditions it stopped shortly after. Kernot describes the use of this machinery as "The grader would pay for itself if it gets a job that suits it, the great difficulty is to fit the machine to the job" [3].

Figure 13: Construction workers dumping ballast on the Bairnsdale to Orbost Line, 1914 (Museum Victoria)

4.4 Research Potential

The history and construction of the railway line has been extensively researched and defined.

The intermediate stations between Bairnsdale to Orbost require further research as not much documentation is readily available. The technical features of the bridges required limited research.

4.5 Social

In the Past

The Social impact of the railway was great as it helped the early settlers unite and provided support economically and convenience in transportation. After World War II the competition between road and rail transport forced the closure of the line in 1987. Considerable investment was made into the road network in East Gippsland. A highway was built parallel to the Snowy River Floodplain Bridges in 1975 [22] [23].

The Orbost district was a poor district in terms of transport, no railway, poor roads and unacceptable port accommodation for shipping. Due to the lack of railway, marketing of goods such as farm produce (barley, oats and dairy) was extremely restricted. During this time, the idea of the construction of a rail track from Melbourne to New South Wales was promoted. In America, where the rail track was constructed first, the settlers soon flocked to the railway corridor. In Australia it was different. Demand was needed before the construction of a railway. At this stage, timber from East Gippsland were not considered of much value due to the cost of hauling it to market and much of the land in East Gippsland was not suitable for cultivation. However, the idea of mining of gold, copper, silver and lead showed opportunity but was greatly restricted due to lack of transportation. In order get the approval for the construction of the railway line, owners of 30,000 acres (12,000 hectares) of land along the river flat near Orbost had agreed to pay a deficiency rate of up to 5 shillings an acre (12 shillings per hectare) for the next 20 years to meet the cost of the line. The land owners were happy to agree to the guarantee because of poor quality roads and uncertain water transport in the area. A deficiency of 6 pence per acre (approximately 15 pence per hectare) was levied on hill land around Orbost. Holders of 3000 acres (1200 hectares) on the Tambo flats near Bruthen agreed at the rate of 2 shillings per acre (5 shillings per hectare) per year. After the railway line was finished, a lot of goods were marketed in Melbourne, using the railway for transport. The most common goods transported were timber, maize, dairy produce, stock and some minerals. The railway line improved the connection of the early settlers to Melbourne [1].

An industry associated with the progression of the railway was the cutting of the railway sleepers. This industry provided the people in the area with employment and income for numerous families along the railway line. It provided essential employment until the demise of the line in August 1987. Sleepers were cut from ironbark, yellow stringy bark and mahogany trees. Tools such as the axe, broad axe, crosscut saw, hammer and wedges were used to trim and shape the sleepers.

A notebook which belonged to Arthur Towns a pioneer of sleeper production wrote “On the average, twelve to fourteen sleepers a day were cut, but the book records seventeen sleepers cut on Tuesday 6th August 1929. Listed also is the amount of sleepers cut in the Stony Creek area. Details are: 120 mahogany, 3 hardwood, 187 yellow stringy bark. During the site investigation, it was evident that most of the sleepers have been removed from the line.

[22] The Historical Society of Bairnsdale

[23] Adams John P. The Tambo Shire Century History. No date.

At the Present Time

The social impact of the railway line today can be observed through its adaptation as part of the East Gippsland Rail Trail.

The Nicholson River Railway Bridge is situated in the small township of Nicholson, and traverses a broad and open river floodplain adjacent to a wide section of river that is home to many small leisure craft. Caravan parks and open farmland are nearby. Its position adjacent to and visible from the busy Princes Highway make its fascinating tall and lengthy profile of greater public interest and value. Such a bridge is aesthetically pleasing and it is a visual experience not often provided by other bridges in Victoria. [24] [25]

The Rail Trail management believe that by investing and developing the Rail Trail, participation rates would stimulate its growth. This could lead to a social morale boost and improvement in people's health within East Gippsland. Furthermore, the Rail Trail has decreased the communication between towns as local people are more inclined to use the pathway, this could stimulate food and service industries.

The railway line, although obsolete, has many beneficial uses in the area of social significance. Built during a time after a substantial depression and during World War 1, the objective of the line was to combine societies, stimulate financial growth and increase population growth. Today the railway line utilises the path and a selected few impressive bridges as a Rail Trail. The East Gippsland Rail Trail still combines the cultural values of towns and is historically a significant piece of elusive history that will not be forgettable due to the recent Rail Trail development [26].

Figure 14 - Bruthen Station Platform (December 2015 Photography: Owen Peake)

[24] Heritage Victoria. Nicholson River Bridge. Victorian Heritage Data Report. No date.
[25] National Trust of Australia (Victoria). Classification Report for the Nicholson River Railway Bridge. No date.
[26] East Gippsland Rail Trail Concept Plan. Resource Inventory. No date.

Figure 15 - Rail Trail in Bruthen Station (December 2015 Photography: Owen Peake)

Figure 16 - Between Burthen and Nowa Nowa (Rail Trails [27] Photography: Steve Bennett 2014)

[27] Rail Trails Australia. East Gippsland Rail Trail.
https://www.railtrails.org.au/component/railtrails/?view=trail&id=143&Itemid=66

4.6 Rarity

The Bairnsdale to Orbost railway is the most expensive project Victorian Railways undertook during that period. Yet despite its difficult place in history (between a depression and a World War) it was built to a high standard even maintaining a ruling grade of 1:50 despite going through steep terrain [3].

Stations buildings along the railway were generally of standard design and have not survived in most cases as they were constructed of timber and were relatively fragile. There are many examples of these stations in Victoria. It also appears that some stations had no platforms and people would just get on the carriage as shown in Appendix 1, Figure 29 and 30 where there are no remains for some of the old stations which stood there. The exception of this is the Bairnsdale Station which remains operational and in good maintenance, however this cannot be considered rare in Victoria. The other main features of the railway line mainly the bridges have a strong degree of rarity, most of the bridges remain intact with some damage due to poor maintenance as these structures are not used anymore.

Some of the structures such as the Nicholson River Bridge were renovated and adopted as part of the East Gippsland Rail Trail and is now well maintained. This bridge is a very complex structure as it presented one of the most difficult engineering challenges in the construction of the railway particularly as the soil conditions proved to be inconsistent and varying making the construction of adequate bridge foundations quite difficult [27].

The Stony Creek Trestle Bridge is one of the longest and tallest remaining examples of a timber trestle bridge in Victoria. It is comparatively rare due to its size with the Noojee Rail Trestle Bridge being 102 m long and 21 m high. Stony Creek has a length of 276 metres, a height of 18.6 metres and has 27 spans, today it is considered the largest timber trestle bridge in Victoria [28]. The Snowy River Floodplain Railway Viaducts were the longest bridge components of the railway line. The lengths of the viaducts are 770 metres and 183 metres. The two bridges used to be made purely out of timber which is from the 'Southern Mahogany' (Eucalyptus Botryoides) which grew along the coast east of Bairnsdale. These viaducts remain substantially intact and are historically and aesthetically significant to the State of Victoria [29].

4.7 Representativeness

This railway line is highly representative in its era as most of the features of the railway line were made out of the native bush timbers along the railway line. It was one of the developmental railway lines wherein they tried to attract more settlers by building the railway line. In order to preserve the historical significance and value of such a railway it was turned into a Rail Trail having a length of 94 km which ranks third among the other Rail Trails in Victoria [27].

4.8 Integrity/Intactness

Today, there is not much left of the railway permanent way as most of it has been recycled especially the rails and the timber sleepers. Fragments of the rails which has been largely removed can be found being used as piers for a foot path bridge in Bruthen. The railway line is now made into a Rail Trail which stretches from Bairnsdale to Orbost. The major features of the railway line such as the bridges are still intact and still show the high engineering standard that were implemented in their construction. Some bridges were lost due to bushfires and floods however the remaining surviving bridges remain intact even despite the lack in maintenance.

[28] Heritage Victoria, Victorian Heritage Database. Stony Creek Trestle Bridge. No date.
[29] Heritage Victoria, Victorian Heritage Database. Snowy River Floodplain Railway Bridges. No date.

5. Statement of Significance

5.1 There is no single statement of significance for the railway in the Victorian Heritage and National Trust registers because the railway has not been nominated as a single site for Victorian Heritage Register purposes.

5.2 The statement below relates to Snowy River Floodplain Bridge and is taken from National Trust data base:

"Statement of Significance

What is significant?

The Snowy River Floodplain Railway Bridges, two sequential and exceptionally long and low timber railway bridges on the Snowy River Floodplain just west of Orbost, were built in 1916, and provided the original terminus point for the Bairnsdale-Orbost railway. The bridges are 770 metres and 183 metres long respectively. The shorter bridge is of uniformly 4.57 metre (fifteen feet) [span] timber-beam construction; retains its all-timber integrity, and has a sweeping curve in its deck. The longer bridge has a combination of 4.57 metre (fifteen feet) and 6.1 metre (twenty feet) spans, and two 3.66 metre (twelve feet) spans; it has concrete replacing timber in the abutments and a few flood-damaged timber beams have been replaced by steel joists. The bridges are unusually constructed from Southern Mahogany (Eucalyptus Botryoides) which grew along the coast east of Bairnsdale [29].

The Snowy floodplain bridges were initially built in the context of an early twentieth-century interest in American-style 'Developmental Railways', designed to open remote areas to closer settlement, even if that meant running at a loss [29].

Why is it significant?

The Snowy River Floodplain Railway Bridges are historically and aesthetically significant at the State level.

How is it significant?

The Snowy River Floodplain Railway Bridges are of historical significance, as part of a railway intended to open up East Gippsland for settlement, and to link with south-eastern New South Wales, and ultimately with Sydney via the New South Wales railway that terminated at Bombala.

Originally these bridges were the terminus point for the Bairnsdale-Orbost railway, the railway bridge that crossed the river into Orbost not being constructed until after World War 1.

When these bridges were built six longer timber-beam rail bridges existed in Victoria, but with modifications to the Yarra Valley Viaduct and with the replacement of other timber bridges, by the early 1940s the longer of this pair had become Victoria's longest timber railway bridge [29].

The Snowy River Floodplain Railway Bridges are unusually constructed from 'Southern Mahogany', Eucalyptus Botryoides, which grew along the coast east of Bairnsdale.

The Snowy River Floodplain Railway Bridges are of aesthetic significance, as they are fully visible from the Princes Highway and the Orbost-Buchan Road. The long low profiles of these bridges winding across the floodplain from Orbost towards Bairnsdale have long been a significant part of the river plain landscape."

5.3 The Statement of Significance below has been provided for this nomination and aims to reflect the whole railway as a single linear site rather than its components:

The Bairnsdale-Orbost Railway was open to public on 10 April 1916 mainly for the isolated communities that were living in East Gippsland and depended on coastal and land transport.

The railway is significant, considering high standard civil structures and bridges that were constructed in the beginning of 20th century as well as the high aesthetic standards of the bridges. Also social, economic and historic aspects of the railway were significant in East Gippsland.

The size of the project is of significance, considering railway construction which was costly and difficult due to steepness and roughness in the region. The railway construction office claimed the railway construction was one of the most expensive and heaviest railway extensions in that era. The project involved approximately 1,530,000 cubic metres of earthwork mainly because of three major rivers [30] along the railway. Also, considering the fact the railway was constructed almost a century ago and involved an enormous number of labour as well as horses instead of machines. This can make the railway historically significance.

Around 100 kilometres of railway was constructed in steep and wild conditions of East Gippsland which required construction of several individual significant engineering structures such as rail bridges. These rail bridges were the major significant civil and aesthetic works. There are six individual bridges that are recognised by the National Trust register. These are the at the Mitchell River, Nicholson River, the Stony Creek Trestle Bridge, at the Boggy Creek, and at Hospital Creek and Snowy River Floodplain Bridges. It should be noted that, Hospital Creek Bridge was destroyed by fire in February 2011.

The Snowy River Floodplain Railway Bridges are significant structures on this railway. This bridges are amongst the longest timber bridges in Victoria, being 770 metres and 183 metres long respectively. Furthermore, Stony Creek timber trestle bridge, located south west of Nowa Nowa has 27 spans, 276 metre long and 18.6 metre high. Stony Creek Bridge is the largest standing bridges of its kind in the state and it is a good example of complex early engineering skills.

Boggy Creek Bridge is another substantial and unique bridge along the railway. The bridge was constructed with mixture of material such as concrete, timber, wrought iron and steel with a deck length of 63 metres. The bridge reflects Victorian Railway technology in different time periods.

There are other significant bridges and structures on the line.

[30] Mitchell, Nicholson and Tambo Rivers.

6. Area of Significance

State significance can be claimed for this railway considering the railway as a linear site consisting of many elements. This railway involves four significant and spectacular structures which are recognised by the National Trust. They are Nicholson Railway Bridge, the Stony Creek Trestle Bridge, the Boggy Creek and Snowy River Floodplain Bridge. Each of these structures has an individual set of characteristics which can be found only rarely in the state. [3]

It is considered that the linear site should be considered for an Engineering Heritage Marker.

7. Interpretation Plan

7.1. General Approach

The ceremony should be held on Sunday 21 of August 2016 to celebrate the 29th year anniversary of the last train to pull out of Orbost Station [31] [32]. The ceremony should be held at the Stony Creek Trestle Bridge.

The ceremony should involve the Rail Trail committee in recognition of all their work in incorporating the old railway as part of the Rail Trail and the regional groups and local government council in the area and officers of the Department of Environment, Lands, Water and Planning (DELWP).

The location for the interpretation of this railway will be beside the existing interpretation panel of the Stony Creek Trestle Bridge at the Eastern end. See sketch map on the following page.

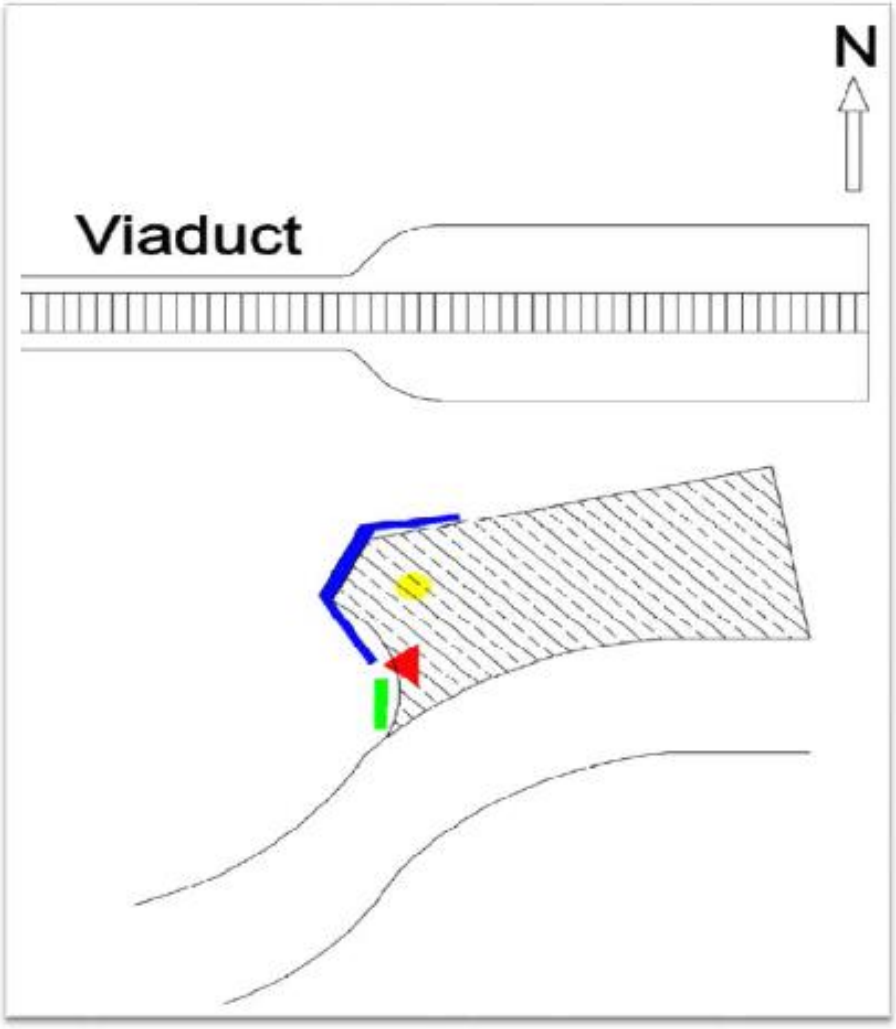
Department of Environment, Lands, Water and Planning (DELWP) has suggested that a damaged mile marker post (205 miles from Melbourne = approximately 330 km) found, unearthed, near the proposed recognition ceremony site should be erected near the interpretation panel and made a feature of the ceremony. Brian "Gus" Gustus of DELWP has undertaken to repair the marker for display. An image of the marker is shown below:

Recovered 205 Mile Marker. ***Image: Owen Peake***

[31] Reference date of last train out of Orbost page 48 at 4:50 pm on 2Friday 21 August 1987.

[32] Hall Deborah. In times Gone by the Snowy River. Deborah Hall. 2002.

Figure below is a Map of proposed Ceremony Site which is located next Stony Creek Viaduct, it should be noted this a mud map and it is not in scale.



- **Not in scale**
- Blue Figure demonstrates Railing
- Yellow Circle illustrates Lectern
- Green Rectangle shows Existing Interpretation Panel
- Red Triangle demonstrates Proposed Victoria Heritage Recognition Mini Panel, further information about the proposed panel can be found in section 7 of this report.
- Hatched area is considered for Ceremony Crowd
- The Map was traced by Owen Peake during the Site Visit

The nomination is for the whole railway as indicated on the route map at page 9. The interpretation will be designed to maximise the linear nature of this nomination with emphasis on the whole railway rather than a concentration on particular features. Nevertheless there is an inevitability that features such as the remaining railway stations and significant bridges will be somewhat dominant.

As a future enhancement of the Interpretation Plan Interpretation panels should also be located at other significant features along the line in the long term subject to funding. Preference should be given to the following locations:

- Bairnsdale Railway Station
- Bruthen Railway Station
- Wairewa Road Trestle Bridge
- Snowy River Floodplain Viaduct

7.2. General Attributes of the Interpretation Panel

It is envisaged that the most appropriate panel in this instance will be a "mini panel" as the proposed site already has very adequate interpretation (See Appendix 7 for copies of interpretation panels already at Stony Creek Trestle Bridge).

1) A title "Bairnsdale to Orbost Railway"
2) Logos of Engineers Australia, DELWP, East Gippsland Shire Council and East Gippsland Rail Trail
3) A small scale representation of the EHA marker plate (typically 150 to 250 mm diameter)
4) A background image (historical or modern)
5) Brief caption for the image
6) Text of about 100 to 120 words
7) The date of the ceremony and names of major stakeholders

7.3. The Interpretation Panel

1) Size to be nominally 850 mm high by 500 mm wide (vertical format)
2) The panel to be constructed of vinyl reflective film on an aluminium substrate with flanges as per drawing at Appendix 8.
3) The panel to be mounted on a steel free-standing frame as per drawing at Appendix 8.

7.4. Preliminary Mock-up for Interpretation Panels

To be added when design completed and approved.

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Appendix 1: Major Stations of the Bairnsdale to Orbost Railway Line

Bairnsdale Station

During the relocation of people near the coastal areas in East Gippsland people ended up settling in Bairnsdale which was surrounded by forests and swamps. Before the railway was extended to Bairnsdale, people would get off at Sale station and travel via the lake or a coach to Bairnsdale. The growth of the population along with the production of goods such as timber, produce and some minerals in the East Gippsland convinced the Victoria Colonial Government to approve the construction of a railway line. The initial railway line only went to Sale and was further extended to Bairnsdale in 1889 [33].

Figure 17 – The Bairnsdale Station in its Early Days

Figure 18: The first train on the Bairnsdale to Orbost Line, 1914 (Museum Victoria, East Gippsland)

In December 1889, R Kroekel was hired to build the Bairnsdale Railway Station. The construction of the station was completed in 1891. The building had a slate roof and only minor changes have been

[33] East Gippsland Rail Trail. The Trail Mail. 2008.

implemented on the building. The first station master was Mr. Woodcock who stayed for two years and later replaced by Mr. Chambers who stayed there for quite a while [33].

Figure 19 - Bairnsdale Station (December 2015 Photography: Joemar Pajar)

Today, the Bairnsdale Station remains in service and lives as part of the Gippsland Railway Line. The station remains in good condition and is still used for both passengers and cargo shipment. There is only 1 platform and the train ride from Melbourne is approximately 3 hours and 43 minutes compared to a 7 hour and 33 minutes train ride in 1916 as shown in Figures 6 and 7 [7] [34].

Melbourne to Bairnsdale via Dandenong, Warragul, Traralgon and Sale

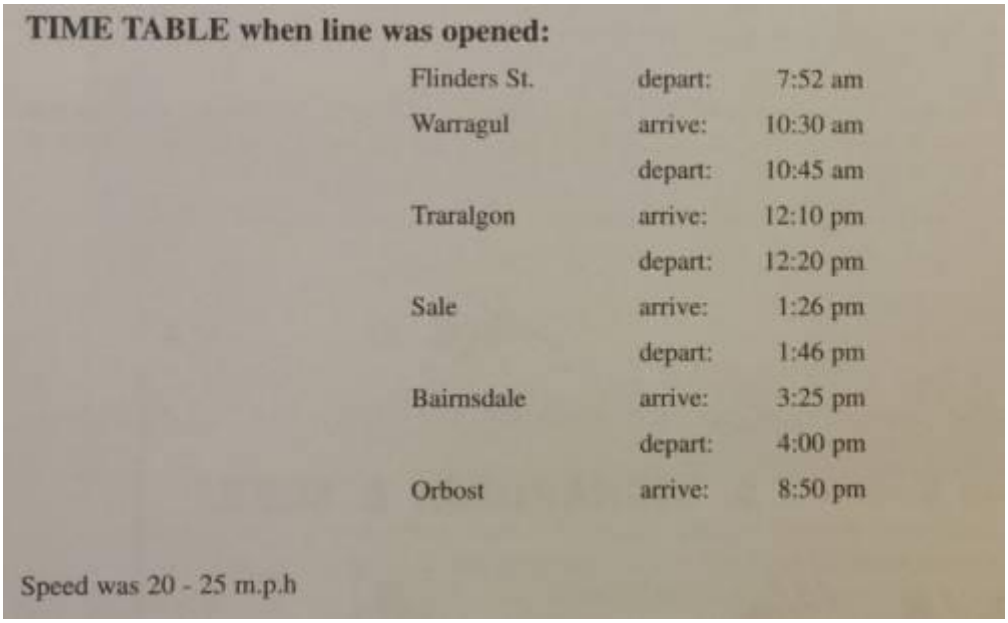
Effective date 21/06/15

		MONDAY – FRIDAY								
Service		COACH	COACH	COACH	TRAIN	TRAIN	TRAIN	TRAIN	TRAIN	TRAIN
Service Information		♿	♿	♿	★▼	♿	★▼	♿	♿	★▼
SOUTHERN CROSS STATION	dep				07:20	08:13	13:20	15:20	16:58	18:34
Flinders Street					07:26u	08:24u	13:26u	15:26u	17:03u	18:39u
Richmond					—	08:29u	13:29u	15:29u	17:06u	18:43u
Caulfield					07:38u	08:38u	13:37u	15:37u	17:15u	18:51u
Clayton					—	08:51u	13:48u	15:48u	17:29u	—
Dandenong					08:05u	09:04u	14:03u	16:03u	17:45u	19:16u
Pakenham					08:26u	09:25u	14:25u	16:25u	—	19:37u
Nar Nar Goon					—	09:30	—	16:30	—	—
Tynong					—	09:34	—	16:34	—	—
Garfield					08:37	09:37	14:36	16:37	18:13	19:48
Bunyip					—	09:42	—	16:41	18:19	—
Longwarry					—	09:46	—	16:45	18:23	—
Drouin					08:51	09:52	14:50	16:51	18:29	20:00
Warragul					08:59	09:59	14:57	16:57	18:35	20:07
Yarragon					—	10:06	—	17:04	—	—
Trafalgar					—	10:12	—	17:09	—	—
Moe					09:18	10:20	15:16	17:15	18:49	20:26
Morwell					09:32	10:40	15:28	17:28	18:59	20:39
TRARALGON STATION	arr				09:42	10:49	15:38	17:40	19:11	20:49
CHANGE SERVICE						COACH		COACH	COACH	
Service Information						♿			♿	
TRARALGON STATION	dep	05:48	07:10	07:45	09:44	11:00	15:40	17:50	19:20	20:51
Traralgon Plaza		—	07:00	—	—	—	—	17:40	—	—
Rosedale Station		—	—	—	09:59	—	15:55	—	—	21:06
Rosedale		06:06	07:28	08:05	—	11:20	—	18:08	19:40	—
Sale (1)		06:55	07:55	08:25	—	11:40	—	18:30	20:00	—
SALE STATION	arr	06:50	08:00	08:30	10:17	—	16:13	18:35	—	21:24
SALE STATION	dep	M			10:19	11:45	16:15		20:05	21:26
Stratford Station					10:34	12:05	16:30		20:25	21:41
Lindenow Turn Off					—	12:25	—		20:45	—
BAIRNSDALE STATION	arr				11:13	12:45	17:09		21:05	22:18

★ – First Class / ▼ – Catering / ♿ – Wheelchair accessible / u – Pick up only / Coach services shown in red / ☐ Reservations required

Figure 20 - Present timetable Melbourne – Bairnsdale Line[34]

[34] V Line Timetable. Bairnsdale-Melbourne.



TIME TABLE when line was opened:

Flinders St.	depart:	7:52 am
Warragul	arrive:	10:30 am
	depart:	10:45 am
Traralgon	arrive:	12:10 pm
	depart:	12:20 pm
Sale	arrive:	1:26 pm
	depart:	1:46 pm
Bairnsdale	arrive:	3:25 pm
	depart:	4:00 pm
Orbost	arrive:	8:50 pm

Speed was 20 - 25 m.p.h

Figure 21 - Old Timetable Melbourne – Orbost Line

Nicholson Station

Nicholson Station was the first station stop on the Bairnsdale to Orbost line. The Nicholson station opened on April 10, 1916 after transporting passengers and goods for many years until it closed on Monday 24 of August 1987. There are no traces of the old railway station. However, the formation along the station are included in the East Gippsland Rail Trail. The old sign board can be observed along the Rail Trail as shown in Figure 23 [1].

Figure 22 - East Gippsland Rail Trail from Nicholson (December 2015 Photography: Joemar Pajar)

Figure 23 - Nicholson Station [35] site

Bumberrah Station

Bumberrah station is the stop after Nicholson Station on the railway line and opened on the same date, 10 April 1916. The station was closed in 1977, with the last train passing the station in 1987. It was also adopted as part of the East Gippsland Rail Trail. The old sign board can still be seen with a rest shelter that includes an information board as shown in Figure 13 [1].

Figure 24 - Bumberrah Station[35]

[35] Vicrail Stations. Orbost Line. http://www.vicrailstations.com/Orbost/Orbost.html

Figure 25 - Shelter near Bumberrah Station [35]

Mossiface Station

This station is located after Bumberrah station on the railway line. The railway reached Mossiface Station by October 1913 and opened on Monday 10 April 1916. But it was closed in 1987. There are little remains of the stations such as the sign board, however the permanent way formation is still used as part of the East Gippsland Rail Trail.[1]

Figure 26 - Mossiface Station

Bruthen Station

The Bruthen Railway Station is located after the Mossiface Station on the railway line. It opened on Monday 16 April 1916 and closed on Monday 24 August 1987. Evidence of the old railway station can be seen as it was included in the East Gippsland Rail Trail. The platform can still be seen and is being covered by vegetation and the sign board still exists as shown in Figure 27. The platform appears to be made out of a timber sleepers with a wooden deck on top [1].

Figure 27 - Bruthen Station (December 2015 Photography: Joemar Pajar)

Colquhoun Station

It is located after Bruthen Station on the railway line, and was opened on 10 April 1916 and was since long closed with the last train passing the station in 1987. It is located approximately 4.5 km to the West of the Stony Creek Trestle Bridge [1].

Nowa Nowa Station

The Nowa Nowa Station is located after Colquhoun Station on the railway line. It was opened on 10 April 1916 and closed in 1987. The station site was used as a large goods storage facility. Today, it is covered in asphalt which and is used as a helipad as shown in Figure 28. The railway is also a part of the East Gippsland Rail Trail. In the construction of the Shrine of Remembrance, the black marble was collected from Buchan and transported from Nowa Nowa to Melbourne.[25]

Figure 28 - Nowa Nowa Station [35]

Tostaree Station and Waygara Station

The Tostaree Station is located after the Nowa Nowa Station followed by Waygara Station before finishing at Orbost Station. The two stations both opened on 10 April 1916 and closed on 1987. There are few remains of the two stations as illustrated in Figures 29 and 30 [1].

Figure 29 - Tostaree Station Railway Line [35]

Figure 30 - Waygara Station Railway Line [35]

Orbost Station

The Orbost Station is located at the end of the railway line. It is also known as Newmerella Station. It was built on the west bank of Snowy River because there was not enough traffic to justify the cost of a bridge and as a result the railway never crossed the river to enter the township [1].

As seen in Figure 31, it appears to be built with the same material used in Bruthen station. The other lost stations could also be made and looked the same as Bruthen and Orbost Station.

Figure 31 - Orbost Station. *Image: Victorian Railways*

The Orbost Station was opened on 10 April 2016. Mr. Fred Christmas drove the first motor passenger train until it ceased in 1935. Due to the government's decision the railway line from Bairnsdale to Orbost was closed in 1987. The last train pulled out from the Orbost Station at 4:50pm Friday 21 August, 1987. As illustrated in Figure 32 the platform at Orbost is now very derelict. During the initial operation of the railway line it took almost 12 hours to travel from Melbourne to Orbost.

Figure 32 - Orbost Railway Station Platform [35]

Appendix 2: Significant Bridges of the Railway Line

Mitchell River Bridge

Prior to the construction of the Mitchell River Bridge, a temporary bridge was used in order to enable the construction of permanent piers. The benefits of this temporary structure were to reduce the cost of placing concrete and erecting steelwork. Each span was constructed using two round logs approximately 22 inches diameter with sleepers 10 inches apart laid onto them [36].

The bridge at Mitchel River was opened on the 10 of April 1916 and was a significant component of the Bairnsdale to Orbost line due to the size of the structure. The distance between the railway and road bridges centre line is approximately 50 feet (15.25 metres) and they are parallel. As the river is subjected to severe flooding, it was advised that the piers should remain in the line of the existing road bridge. The Rail Bridge consists of 5 spans of 76 ft 8 in (23.368 metres) and 5 flood openings of 30 ft (9.144 metres) [3] [36].

Cantilever Plate girders (continuous plate girders) were adopted for the five 76 ft 8in spans in preference to simple spans, simple spans would have cost an additional £400. The 100 foot girders (6 ft 3in depth) were taken down to Bairnsdale on a special train and were erected by a method Malcom Moore, Assistant Engineer devised [3].

“The superstructure was designed to carry the “120” ton engine (Cooper’s E.40), which may run on the line within 25 years. The substructure was computed for the “160” ton engine (Cooper’s E.50)” [3]. This decision was based on minimal cost variation for a heavier load and to provide for developments in the future.

Throughout the seasonal year, it was configured that the maximum clearance of the river for the summer period was 21 ft 9 in which is then reduced to 4ft 6in in peak flooding conditions. Geological investigations showed sandy silt and black clay, with coarse gravel. All four central piers indicated the same geological characteristics and depth. “The concrete for all the piers was mixed with a batch mixer on the Western side of river and tipped into small wagons which ran along the temporary bridge” [3]. Piers 2 and 3 are within the river, survey surroundings of the area showed 8ft and 11ft at these points, however when construction commenced it was found that the river bed raised significantly. Due to scouring of the bridge, it was found that this increased the depth of pier 3 to 22 ft (6.7 metres).

From the design process, it was decided that the best possible foundation used would be elliptical concrete “well” piers which were “17ft 6in x 14ft, with the walls of these piers being 3ft 6in thick” [3]. Regionally, during this period this type of pier was commonly used in the East and has been used in Victoria for the two railway bridges across the Avon River.

Furthermore, in regards to the foundations the use of twin cylinder piers were investigated, comprising of cast iron or reinforced concrete, however these could have not been braced together below the ground surface. With scour being problematic, it was then advised that two long columns with small diameters only braced together for a short distance at their tops would not make an adequate design. From estimations it was also gathered that twin cylinders would also cost £200 more per pier than the original design [3].

[36] Heritage Victoria. Victorian Heritage Database Report. Mitchell River Bridge. No date.

As mentioned by Kernot [3], it was found during construction that the river bed had scoured during recent years to a depth of at least 35 ft below summer levels. Also, no precedent could be found for sinking concrete well piers through such a depth of water, expensive amendments were made such as coffer-dams and steel shells. The addition of 6 piles from 60 ft to 70ft long, were built around the site of each river pier [3].

Figure 33 - Erosion from one of the Foundation in Mitchell River Bridge. ***Image: Owen Peake***

The present condition of the Mitchell Bridge demonstrates the Engineering Standards used during that time. As the concrete pier has deteriorated over time, it has revealed that the aggregate used in the piers was not of consistent size and that the aggregate was natural river peddles gathered from the river or neighbouring sites.

The Nicholson River Bridge

The bridge was built during 1915-1916, and is a single track sixteen span composite structure. The superstructure has a 180 metre length and combines solid concrete piers, timber trestle piers, timber driven pile piers, large trusses, plate girders and steel joist spans. [24]

The specifications of the foundation were the governing factor in detailing the type of bridge and span lengths, therefore the most economical type was chosen for each side of the river. Also, due to the location of the Nicholson River being located in a rural area with an insignificant population to cater for, it was chosen that an unsymmetrical bridge would suffice as an aesthetic appearance would not justify an increase in project costs [3].

Extensive boring was completed at the site to determine the foundation strength, Kernot [3] says that “At the original river bed was 80 feet below the present level and 500 feet in width, the basin is now filled up with black river silt, and the existing channel hugs the western bank, the present river bed being 50 feet above its original position”. Through thorough design, it was calculated that the most feasible span length over the river channel proved to be about 120 feet, and that a more expensive

truss was required for the longer length of spans. Due to the nature of the foundation, the location of pier 4 did not make a substantial change in cost [3].

“Pier 3 was located on the Western Side of the bridge, it was found from various boring that on the west bank the geology consisted of rock, therefore, it was appropriate to use concrete piers for the two 24 feet and the 50 feet approach spans. Further investigation demonstrated that bores tested the ground conditions for cavities, and that the pier was embedded into limestone edge. Within this area, loose surface rock was removed by excavation …. to 22 feet square for depth of from 2 to 5 feet by means of rail chisel and grab [3].

“On the Eastern side, where the borings showed 80 feet of mud, it was chosen that the best suitable choice would be a pile trestle structure consisting of 12 spans of 27 feet. To measure the effectiveness of the geological strata, it was essential to obtain consistent bores and results. The preliminary site investigation suggested layers of hard limestone, however when work commenced there were variations in this, as some areas were considered soft, chiefly soft, rotten and numerous boulders of hard stone were discovered [3].

“The concrete at the base of the pier which was a total of 22 feet in height up to water level was laid under water with a collapsible box and placed by a diver, which during the time was easier to construct rather than more generic methods such as a tremie [3].

Kernot[3] directly mentions that in the design of the pier, the variation of load due to brake action on trains was a considerable factor, furthermore, during the 20 years prior to this design the majority of bridge piers were designed without taking braking loads into account. Also stating that “latterly the practice has been to provide for a horizontal force equal to 20 per cent of the live pier load at each pier”, resulting in unusually large dimensions for piers supporting small spans. [3]

Kernot [3] mentions “The subaqueous portion was well bonded together with old 80 lb rails laid about 2 feet apart in three horizontal layers at right angles to each other” with the additions of 8 vertical rails attached to the foundation and extending up to a few feet, to essentially removed the tensile stress caused by the brakes [3].

“The upper-works consisted of eleven timber trestles carry 28 feet long rolled steels joists finishing with timber decking that was originally built from stringy bark and messmate timber [3].

“Initially it was intended to build a coffer dam at pier 3 after the steel sheet piling had been removed from Pier 4 but this was not done due to the delay which this would have caused and the acceptable subaqueous concrete at Mitchell River [3].

“At Pier 4, the conditions were similar to Pier 3 with 20 feet of water above 60 feet of river silt. Nevertheless, this required special consideration and are noteworthy. The adopted solution was a concrete pier 20 feet in diameter; this magnitude was chosen in case of landing on sloping rock. It was proposed to grout through vertical tubes in the pier wall, which would act as tie rods [3].

“When work commenced for the 56 foundation piles, work also began on the eight 70 feet guide piles that were implemented for the coffer dam. After foundations were completed, the coffer dam construction began with the wailings and internal bracing placed in position and the steel sheet piling driven. Based on the assessment of the hydrostatic pressure, it was recommended to use strutted corner spacers 6 ft, 7 ft and 11 ft apart with internal braces of 16 in x 12 in hardwood [3].

Figure 34 - Nicholson River Bridge. The Rail Trail deck. *Image: Owen Peake*

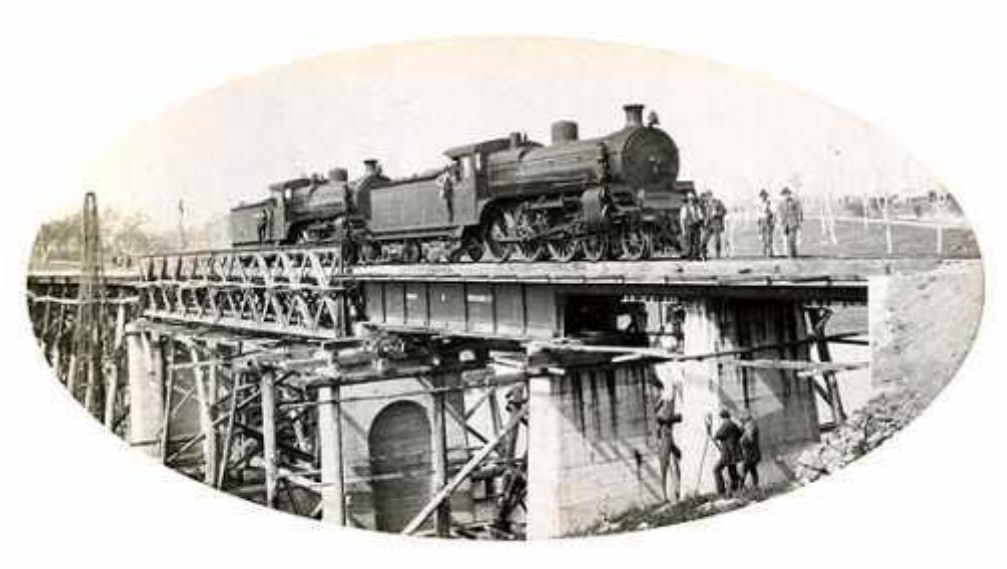


Figure 35 - Test with two A2 117 ton locomotives at the Nicholson River Bridge, 1915 [37]

The above photograph represents the two A2 class 117t steam locomotives stationary on the bridge, timber staging is still in place beneath the centre truss and the far side of the bridge is of timber construction. There is a pile driving derrick on the left. Two men with a theodolite on a tripod stand on the bank on the right. They are measuring deflection of the bridge under load. The riveted steel plate girder in the foreground bears the name "Johns & Waygood Ltd." [37]

Temporary Nicholson River Bridge

"Similar to the temporary bridge Mitchel River Bridge, the temporary bridge at Nicholson River was necessary as it reduced the cost of the overall cost of the Nicholson River Bridge through reducing the cost of placing concrete and steel in the permanent bridge. It comprised of 21 openings of 20 ft and one of 35 ft for navigation, piers were formed of four 80 ft piles in the river channel with a long cap and two upper piles about 32 ft long. Elsewhere two 60 ft foundation piles were used for each pier, the superstructure consisted of a pair of RS Joists 20 inch x 7½ inch x 89 lbs, sleepers being laid directly on them. The bridge was constructed 35 ft center to center and the reverse curves were 600 ft radius without superelevation, therefore a slow speed train was necessary [3].

Tambo River Bridge

The temporary bridge at Tambo River consisted of 23 openings 20 ft. of the same type as at the Mitchell, was used to expedite the construction [3].

The line crosses this river at Bruthen at a point about a quarter of a mile below the existing road bridge that has 75 ft timber truss spans. According to Kernot, "Old residents of the district affirm that the river has so silted up in the past 30 years that the original road bridge, which had considerably over 10 ft clearance when built, is now buried under the present sandy river bottom. This is quite probable, for numerous logs were met [in constructing the railway bridge at depths] from 20 to 25 ft below the river bed, and, in one case, a red gum stump was found 41 ft below the present surface" [3].

"At the railway crossing, the river has a flat, sandy bottom about 350 ft in width and generally dry except for a narrow stream. As quoted by Kernot, "Within 48 hours this may become a torrent 16 ft deep and 500 ft wide, with a velocity of 7 to 8 miles per hour. Due to this it was uncertain the depth of sand disturbed, subsequently this lead to a deeper foundation [3].

"Boring of the site indicated 25 to 40 ft of drift sand and silt, to a deposit of gravel about 2 ft in thickness then 15 to 20 ft of drift sand to a bed of hard gravel over 20 ft in thickness. This lead to the same twin cylinders piers as used for the Mitchell Bridge being chosen [3].

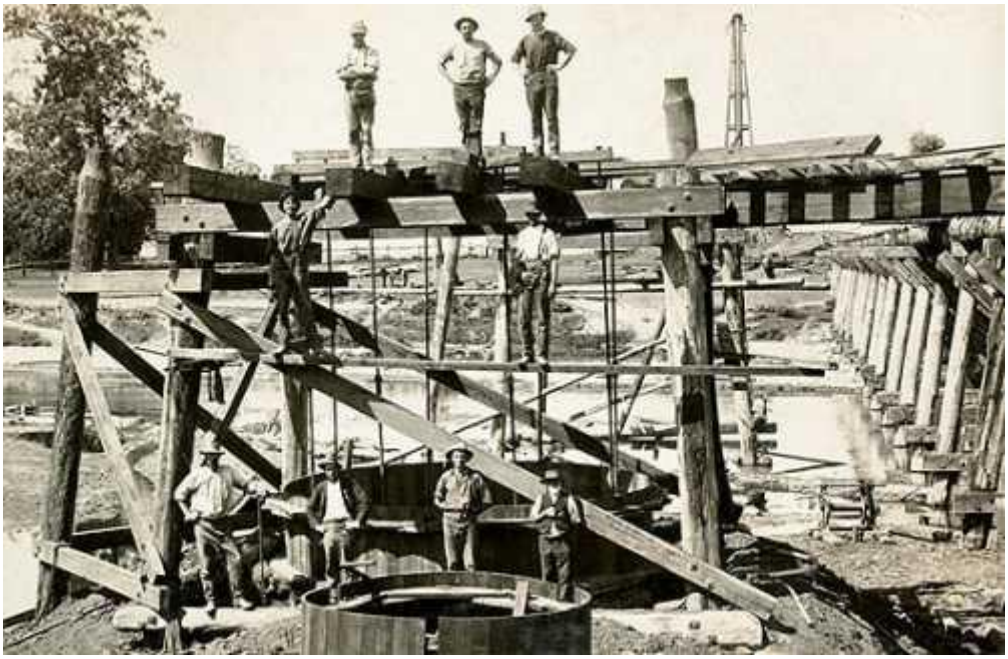


Figure 36 - Workers constructing Pier 3. *Image: source unknown.*

Figure 36 demonstrates the construction of Pier 3 of the Tambo River railway bridge. The outer timber form for the concrete pour is in place. Formwork is suspended from timber staging by threaded metal rods used to jack formwork up as concreting progresses. A temporary timber construction bridge on the right is joined to the timber staging. A pile driving derrick is visible in the background and there is a small crab winch on the river bank to the right [37].

Stony Creek Trestle Bridge

The Stony Creek Trestle Bridge was built in 1916 and is regarded as the most aesthetic on the Railway Line. The trestle consists of 27 spans of 30 ft totalling a length of 810 ft built of Red Iron bark and Grey Box timber. Piers average about 55 ft high and the maximum is 63 ft. The piles in the structure composed of White and Yellow Stringybark, all consistent in size except two piles at each end are spliced a few feet above the surface. The superstructure consists of four 100 pound Rolled Steel Joists with 5 inch thick timber transverse decking with the rails laid on ballast [3] [28].

The Stony Creek Bridge was damaged by fire in parts of the structure was then repaired and used until the end of the use of the line in 1987 [28].

Figure 37 - Stony Creek Trestle Bridge. ***Image: Owen Peake***

[37] Museum Victoria Database. Charles H Perrin Album. Victorian Railways. No date.

Figure 38 - Stoney Creek Trestle Bridge from the Western end. *Image: Owen Peake*

Boggy Creek Bridge

This steep valley bridge was built in 1916 at Nowa Nowa and is regarded as the most picturesque and socially significant in the railway line. The railway bridge crosses the gorge just before the stream enters the North section of Lake Tyers at Nowa Nowa and is approximately at the 368.39 kilometre mark on the Bairnsdale to Orbost Line [3] [38].

Due to the geographical position of the bridge, the creek gorge represented many challenges in the design as the structural integrity was vulnerable due to fast flowing creek stream conditions. The complexity of the design resulted in the main river span piers being built of concrete.

As mountain streams with a high velocity and an uninhabited environment, at the time it was difficult to obtain reliable information about the highest known flood. Kernot mentions that flood waters have reached 30 ft above the creek bed. [3]

The design of this railway bridge encompasses unique characteristics as the line is at a height of 65 feet on a 15 chain curve and the central span of 60 feet is on a skew of 55 degrees. Wrought iron plate girders were used for the main creek span, with timber beams placed on concrete sub piers for the approach spans [3].

The foundation is comprised of concrete piers and timber trestle spans/steel trestle spans are situated on concrete bases to increase stability and deterioration when flooding occurs. Wrought-iron plate girders were used which were 6 ft in depth and were erected by skidding along runways formed of two lengths of 80 lbs steel rails 31 ft 9inch long. The 60 feet (18.23 m) long wrought iron plate girders were recycled from the North Eastern Railway.

[38] Heritage Victoria. Boggy Creek Bridge. Victorian Heritage Database. No date.

The superstructure comprises 17 spans in total. One of these is the wrought iron main creek span; 11 are timber beam spans and the remaining 5 are steel joists. The total length of the bridge is 63 metres all of which is finished with timber decking with the rails laid on ballast [3].

This bridge plays a major part in the identity and history of the town of Nowa Nowa, since Boggy Creek's steep sided valley divides the township into two components. Using timber, iron, steel and concrete this bridge aims to demonstrate the hardship of the era due to the limited funds available and the engineering innovations.

Figure 39 - Boggy Creek Bridge in 2015. *Image: Owen Peake*

Figure 40: The Boggy Creek Bridge 1915. *Image: source unknown.*

Figure 40 shows the completed Boggy Creek Bridge consisting of a riveted wrought iron plate girder main span over concrete piers with Rolled Steel Joists and timber beam approach spans on concrete piers at either end [37].

O'Grady's Creek Bridge

The Wairewa Road or O'Grady's Creek trestle bridge began construction in 1914 and was completed in 1915. The bridge consists of timber trestles built from Red Ironbark and Grey Box timber. The wrought iron riveted girders are placed on timber cross heads. Like most of the other bridges, much of the metal materials have been recycled from other bridges in the region that are no longer in use or have been upgraded. The girders of this bridge are said to have been recycled from a bridge on the North East Line to Wodonga, probably the bridge over the Broken River at Benalla, which was rebuilt with larger steel girders at about the same time.

Hospital Creek Bridge

The Hospital Creek Bridge was built in 1916 and was located at the 347 km mark on the Bairnsdale to Orbost Railway. The design of the bridge consisted of a single railway track of timber trestle design. The spans were 20 feet (6.1 m) which was the maximum size available and used by Victorian Railways during the 20th Century for timber trestle bridges. Chef Engineer, Kernot, of the Victorian Railways introduced innovative fastening techniques to avoid damage from spiking and to enhance bridge life.

Unfortunately in 2011 there was a bushfire that destroyed the bridge and only remnants of the bridge such as steel jointing materials remain [3] [39].

[39] Heritage Victoria. Victorian Heritage Database Report. Hospital Creek Bridge. No date.

Figure 41 - Remnants of Hospital Creek Bridge. *Image: Owen Peake*

Snowy River Floodplain Bridges

According to the National Trust of Australia, "because of sand bar problems in the Snowy River estuary, coastal shipping had proved very unreliable transport for the Orbost district. Heavy maize crops, and an expectation that mineral exploration and exploitation in East Gippsland would be encouraged by the construction of the railway" [29].

Newly found early 20th century interest in American Style, 'development railways' (without financial contributions from maize growers of the Snowy River and Tambo River floodplains) created an interest in building the line. Without this philosophy the line would not have been built [29].

This trestle running across the flats at Orbost is regarded as the longest in the state, it is comprised of 159 trestles in the main section.

The main reasons for implementation of these bridges included increasing the population within the East Gippsland region, mode of transport available for residents in rural regions, and at the time of construction the possibility of eventually joining Melbourne to Sydney via the continuation of the railway from Orbost to Bombala [29].

The Railway Line did not continue passed Orbost to Bombala due to the lack of population within the region which did not generate many votes. Due to the lack of use the railway line was closed in 1987 as part of an overall government decision. However, the pair of Snowy River Floodplain Bridges acted as the bridging catalyst for future growth at the time of construction and should be regarded as a significant relic of the early years of the Commonwealth of Australia [29].

“They were constructed during difficult years in World War 1, when both labour and material supplies were very problematic”. The construction of this railway meant that societies along the railway could connect and the communication barrier would narrow [29].

The Snowy River Floodplain consisted of two continuous low timber trestle railway bridges. The end of the rail line finished at Orbost Station west of the Snowy River and hence well short of the town of Orbost. The larger bridge being 769.95 metres in length is located on the Bairnsdale end of the rail line. It has inconsistent spans as they vary from 15 feet (4.57 m), 20 feet (6.1m), and two 12 feet (3.66m) spans.

During its useful lifetime the bridge endured several floods with significant impacts occurring during the 1971 flood. After this event, concrete replaced timber in the abutments and timber beams were replaced by steel joists utilising the remains of the Dorman Long supplies [3] [29].

This adjacent pair of unusually lengthy timber railway bridges are separated by an earthen embankment at rail level that has the same height of the railway line; without this the bridge would have formed one continuous structure. The second bridge is 182.88 metres long, consists of a curving deck and is composed of 15 feet (4.57 m) timber beam spans. Due to the separation from the parcel of land, the smaller bridge only suffered minimal flood damage [3].

Figure 42 - Condition of the Snowy River Floodplain Bridge at its western abutment. ***Image: Owen Peake.***

Appendix 3: Lorain Steel Company [40]

Second among Johnstown's steel industries is Lorain Steel Company, bearing a name from the lake shore in Ohio and subsidiary of the United States Steel Corporation, but conceived as a user of unfinished products of Cambria Steel plants and as distinctively a Johnstown industry as any the town boasts. Lorain Steel grew out of the development of street railway transportation and once was prepared to leave Johnstown, bag and baggage, because its own means of transporting raw and finished materials was blocked and checked.

Like Cambria, Lorain went through a lot of hard knocks before brilliant invention, skilful workmanship and sound business abilities brought their rewards.

Mr A J Moxham, then a resident of Louisville, Kentucky, had an idea. The low "T" rail then being laid on public highways for street railroads with their small and light horse drawn cars was too narrow for other vehicles to ride upon and it made jolty and dangerous crossings. Mr. Moxham wanted a tread on the street car rails. Such a rail would sell readily, he believed, for the street railway industry was spreading rapidly and a better rail would be of service in reducing objections to trolley lines. Mr Moxham was associated with Tom L Johnson, creator of cheap transportation in Cleveland, and Mr A V du Pont. They formed the Johnstown Steel Street Railway Company, March 7, 1883, for the manufacture of girder rails and switch work for street railways.

Mr Moxham took the idea of tread bearing rail to Cambria Iron Company, which agreed to roll this forerunner of the modern girder rail. Cambria mechanics and rollers, after repeated attempts, were ready for quantity production of such a rail. With their usual disregard of official or scientific terms, they designated this as the "Jay Bird." Mr Moxham established a Main Street office and residence here, and a small force of men, at an unroofed plant on Center Street, began work with a hydraulic jack bending Cambria rails to suit the various specifications of street railway builders in turning short corners on city streets. Where the Pennsylvania freight station now stands the Moxham workmen turned out the first street railway switch work for the Johnstown trolley lines. In the fall of the year the plant was moved into the old wire mill, on the present site of the Swank Pottery, Woodvale. The machine shop work was done at the establishment of John McKenna on Portage Street. The old barb wire mill housed the industry until 1886, when a new plant in Woodvale was occupied. Business was growing rapidly, and in 1888 a part of the Von Lunen farm in Moxham was purchased as a site for a rolling mill. More capital was brought into the industry and its name was changed to the Johnson Company, December 7, 1888. In the following spring, May 31, 1889, the Woodvale plant was ruined in the flood, but the company was able to build a new plant on the Moxham site and continue the production of switches in increased quantities.

[40] History of the Lorain Steel Company. http://history.rays-place.com/pa/cam-lorain-steel.htm

The progress of the industry after that was uninterrupted. Mr E B Entwisle, the first general manager, and others of the early organization, remained year after year. The rolling mills were completed. The use of electricity as a motive power for street cars rapidly supplanted horses, heavier cars demanded heavier rails, and poles and wires for the transmission of electricity called for greater tonnages of steel and many adaptations or new devices in switches and rails. Instead of rails four inches high, rails of 10 1/2 inches were in demand. Types of street paving had changed, too, with block and brick on the ties of the railway tracks. The Johnson Company kept pace with the demand for higher rails without sacrificing old rails by making chairs to place under the low rails. An old English drop hammer did the work. Then electric welding became possible and the company undertook to weld the chairs on rails with the standard girder head, but with a bulb vase, thus saving the weight of expensive steel and the cost of applying separate chairs. But about the time this new process had been perfected the panic of 1893, together with the rapid reduction in the ordinary cost of making steel and the threat of changes in tariff policies, knocked down the market price of girder rails from $90 and $120 a ton to $20 and $30 a ton. Steel became so cheap that added weight of rails meant little. The steel was worth less than the cost of welding. However, the old drop hammer had made enough money for its owners to enable them to forget the flood and also to withstand the losses incurred in the welding experiments, the results of which were not by any means a total loss.

Ferndale bottom lands, about the best available sites for heavy industry in the Johnstown district, were bought for a furnace and steel works plant. The Johnson Company wanted to supply its own steel. Nothing was lacking except transportation facilities. For its own use it had constructed the Johnstown & Stony Creek Railroad to the Moxham plant, but no connection had been possible with the Pennsylvania Railroad. It would hardly be unfair here to recall that the Pennsylvania Railroad at that time was directly or indirectly interested in several steel plants, that it went to great lengths to retain some control of coal mining and other heavy tonnage industries, and that it naturally did not encourage any traffic arrangements here which would favour the Baltimore & Ohio Railroad operating over its branch lines from Rockwood. Neither would it be unsafe to say that Cambria did not wish to lose a good and growing customer and at the same time acquire a rival in the making of raw steel in its home territory. Both the Pennsylvania Railroad and the Cambria Company were factors in politics.

Cambria was dominant in Johnstown, its plants were growing, it had no serious competition in the field of labour, and it did not then feel or acknowledge the need of a connecting railroad. It had, in fact, great possibilities of its own in its plant railroads for a future belt line encircling the entire industrial and residence district, and admitted facts in its history indicate that it long had adhered to a policy of cooperation with the Pennsylvania Railroad so long as that policy was mutual, but was determined to control the situation for its own interests regarding any future invasion of Johnstown by a trunk line rival of the Pennsylvania. Furthermore, Cambria was ambitious to be and remain more than a producer of unfinished materials. It had no rivals then which it really feared because of size or financial power. Pittsburgh was making steel in great quantities but finishing little. It supplied dozens of other industries, but that was not the Cambria idea. The same old fight is still going on today, sometimes in reverse, but that merely means that the other fellow is striking the first blows. Henry Ford, for instance, has built up his gigantic automobile industry on cheap steel, but long ago set out to make his industry independent in both steel and in coal, and has even undertaken to own his own system of transportation. The Ford battle against the general steel industry, perhaps, is not unlike the fight of the Johnson Company with Cambria, and the key to the battle was the railroad, or the Johnson Company so believed.

The little Johnstown row was perhaps a big thing, much bigger than the question whether an industry would continue to grow here or merely elsewhere. The Johnson engineers looked about for the best location of their plant with respect to transportation. They determined the facts in favor of the Great Lakes, with water transportation to Tidewater and to Chicago and with short rail hauls to the growing cities, railroads and agricultural and mining communities of the Middle West. As a lake port, they selected Lorain, Ohio. Money earned in Johnstown was expended there in blast furnaces. Other funds were raised. The rolling mill equipment in Moxham was loaded on cars and shipped to Lorain, leaving here only the rolling mill shed and the switch works, and these, too, were to be taken away.

The managers of the new industry had taken great interest in civic and community affairs, especially in the housing of employees and in street and other improvements. Many of its men went to Lorain, but some, including men with fine records for loyalty and ability, could not go. So good was the record of labour at the Moxham plant that the company finally decided to maintain a works here. The tonnage of steel required by the switch works was not heavy. In May, 1898, the name became the Lorain Company for both Lorain and Johnstown plants. Soon thereafter Lorain Company became a subsidiary of the Federal Steel Company, and Federal Steel, in turn, was absorbed in United States Steel Corporation, February 11, 1901. The products of the Johnstown plant were still further specialized and the denial of railroad connections to the Johnson Company in a few years had brought here a unit of the greatest steel combination on earth under an Ohio name.

Appendix 4: Victorian Railways History

Victorian Railways History 1839 – 1899 [41]

1839 - Government Surveyor Robert Hoddle makes provision for railway linking Melbourne and Hobsons Bay.

1851 - September 7th Public meeting calls for a railway linking Melbourne to Sandridge [Port Melbourne]

1853 - January 20th Government approves the establishment of the Melbourne and Hobsons Bay Railway Company.

1853 - February 8th Government approves the establishment of the Geelong and Melbourne Railway Company and the Melbourne, Mount Alexander and Murray River Railway Company.

1854 - September 12th opening of the Melbourne and Hobsons Bay Railway using a locally constructed locomotive. This is possibly the first locomotive hauled train in the Southern Hemisphere.

1854 - December 25th first imported locomotive of the M&HBRCo enter service.

1855 - Victorian Colonial Government conducts various enquiries and surveys are carried out for country railways

1856 - April 1 Victorian Government Railway Department established as part of the Board of Land and works. George Christian Darbyshire appointed as Engineer in Chief.

1856 - May 23 Government takes over the MMR&MtARCo.

1857 - May 13th M&HBRCo line to St Kilda Opened

1857 - June 25th Geelong and Melbourne Railway opened.

1857 - June Government approves the establishment of the St Kilda and Brighton Railway Co.

1857 - November 24th Government approves the establishment of the Melbourne and Suburban Railway Company. On the same day a series of Acts were passed approving the construction by the Government of railways linking Melbourne to Echuca and Geelong to Ballarat.

1858 - March Contracts let for the construction of railways between Melbourne and Bendigo [Cornish and Bruce] and Geelong and Ballarat [Evans, Merry and Co].

1858 - May 12th & 31st First five locomotives for the Victorian Railways delivered from George England & Co

1858 - June 7thWork begins on the Melbourne Bendigo Line

1858 - July 23rd work commences on the Melbourne and Essendon Railway Company

1858 - July Second batch of ten locomotives ordered from Beyer Peacock & Co. Five passenger engines [7/1858] and five goods engines [4/1859]. Later J and P Classes.

1858 – August 26 Work begins of the Geelong Ballarat Line.

[41] Victorian Railways History. Australian Railway Historical Society Inc. Victorian Division. http://www.arhsvic.org.au/index.php/rail-history/victorian-railways-history-1839-1899

1858 - First Spencer Street Station constructed.

1859 - January 13 Opening of the Government Railway from Melbourne to Williamstown and Melbourne to Sunbury.

1859 - June, Third order for locomotives, ten saddle tank locomotives placed with George England & Co [7] and Slaughter Gruning & Co [3]. Possibly for the Williamstown branch. Later L Class.

Railway History 1860 – 1879 [41]

1860 - May 17th Thomas Higinbotham replaces Darbyshire as Engineer in Chief.

1860 - September 3rd Colonial Government takes over the G&MRCo

1860 - Second order of locomotives delivered during this year.

1861 - July 8th Sunbury to Woodend opened

1861 - Additional orders for goods and passenger locomotives [B Class & O Class] placed with a number of British manufacturers. The first of these locomotives were delivered in July/August 1862. Successive orders were placed for locomotives of these classes into the 1880's

1862 - March 29th Geelong to Ballarat line completed.

1862 - April 10th Geelong to Ballarat Line opened.

1862 - March 31st M&SRCo is purchased at auction by the Melbourne Railway Company.

1862 - April 25th Woodend to Kyneton opened

1862 - May MRCo takes over the operation of the StK&BRCo.

1862 - October 7th First locomotive reaches Bendigo.

1862 - October 20th Official opening of the Melbourne to Bendigo Railway. Another Official Opening was held at Castlemaine on 15th October.

1863 - Tenders called for the railway from Bendigo to Echuca.

1864 - July 1st M&ERCo closes and locomotives disposed of to South Australia and New Zealand. Colonial Government eventually purchases the line in 1867.

1864 - September 19th Railway to Echuca opened.

1865 – June 15th StK&BRCo taken over by M&HBURCo.

1865 - June 30th MRCo amalgamates with the M&HBURCo.

1867 - August 27th Government purchases the M&ERCo. As prelude to the construction of the North East Line to Wodonga.

1869 - Surveys conducted for the North East Line.

1870 - tenders let for the North East Line.

1870 - October 18th Thomas Higinbotham submits a series of proposals for lines to link towns in Western Victoria. Because the lines were colour coded on the map the resulting discussions become known as "the Battle of the Coloured Lines”.

1871 - January 9th Government resumes services to Essendon

1872 - April 18th North East Line opened to School House Lane, just south of Seymour

1872 - August 26th North East Line reaches Seymour following the completion of the Goulburn River bridge.

1872 - Victorian Railway builds its first locomotive at the old Williamstown Workshops. No.100.

1873 - November 21st North East Line completed to Wodonga

1873/74 - Phoenix Foundry of Ballarat builds ten goods locomotives [Q Class} for the North East Line. The Phoenix Foundry was ultimately to build 352 locomotives for the Victorian Railways by 1904.

1873/79 - Most of the lines built in the 1870's were far lighter in construction than those built in the 1860's. This created a need for locomotives designed for light lines. Between 1873 and 1879 various attempts were made to find suitable designs. While a number of unsatisfactory locally built attempts were produced, Thomas Higinbotham was sent overseas to Britain and the United States to find a solution. Two pattern locomotives [F Class and T class] were delivered from Beyer Peacock in 1874. A number of the F Class were constructed by Phoenix between 1876 and 1880. An example of both an F and a T Class are in the Museum collection. However, Higinbotham was convinced that American practice was better suited to Australian needs. Two American passenger locomotive [Rogers D Class] were delivered in 1877 and two American Goods locomotives [W Class] were delivered by Baldwin Locomotive Works of Philadelphia in 1880. Additional goods locomotives were ordered in 1882/3 and a modified version built by Phoenix in the same years. In a political turmoil in 1878, Higinbotham was dismissed and his influence did not last beyond the appointment of a Board of Commissioners in 1884. At that time orders were placed for local copies of the Beyer Peacock locomotives.

1874 - July 7th Line from Castlemaine to Maryborough.

1874 - American bogie carriages introduced many were subsequently built locally. [Carriage 11AA is an example of this style of carriage].

1875 - As a result of the 'Battle of the Coloured Lines" lines were completed from Ballarat to Maryborough [2nd February] and Ballarat to Ararat [7th April].

1876 - July 4th Victorian Government bridges the Murray River to link with the privately owned Deniliquin to Moama railway. The Victorian Government ultimately bought this line in 1923.

1877 - July 27th railway extended from Geelong to Colac

1877 - December 19th railway extended from Ararat to Portland.

1878 - January 8th Thomas Higinbotham dismissed along with many other civil servants in a constitutional crisis.

1878 - July 1st Colonial Government purchases the M&HBURCo as a means of obtaining access for the Gippsland Railway to Melbourne. Victorian Railways operate the former private system.

1879 - April 2nd Gippsland railway completed. This line was opened in sections, Morwell to Sale [June 1877], Oakleigh to Bunyip [October 1877], Moe to Morwell [December 1877], Bunyip to Moe [March 1878] South Yarra to Oakleigh [April 1879].

Railway History 1880 – 1899 [41]

1880/1884 - In this period the Victorian Railways were directly under Ministerial control, and following the events of January 1878, few dared to challenge the minister. Higinbotham was one of few public servants who had not been re-instated after his sacking and it was commonly believed that this was because he had frequently clashed with his ministerial head.

1880 - December 28th Railway Act authorizes the construction of 23 new lines in metropolitan and country areas.

1882 - The Victorian Railways begin experimenting with a Rowan Steam railcar, intended for use on lightly trafficked lines.

1884 - February 1st Railway Commissioners were established and the first Railway Commissioners appointed, Richard Speight, Alfred Agg and Richard Ford. Speight, The Chairman, was formerly an assistant manager of the Midland Railway in England. Speight set about a virtual re-equipping of the Victorian Railways, upgrading existing light lines, replacing older locomotive stock with a series of standard designs, providing new passenger rolling-stock. Much of the re-equipping was based on Midland Railway practice.

1884 - December 12th Railway Act authorizes the construction of sixty-six additional lines. It was noted that there were railway extensions in virtually every electorate and that many were included purely for the electoral advantage of politicians. A number of the lines had little social or economic justification, but in the euphoric period of the 1880's boom construction of these lines was pushed ahead. This created great pressure on the Railways Department and last of the lines were not completed until 1893.

1884 - construction of the Newport Workshops commenced and completed in 1888/9. Construction of carriages commenced in 1889. These carriages returned to a more traditional English pattern with full compartments and side doors.

1884 - Richard Speight arranged for the preparation of a series of standard locomotive designs [D, Y, New A, New R and E classes]. These locomotives shared many common parts. A pattern Y and E Class were imported from Kitson's of Leeds, but the others were built to design drawings supplied by from Kitson's. [examples of the Y and E Class are displayed as part of the Museum Collection].

1884 - The North East line is extended across the Murray River to Albury, but because of the difference in track gauge between Victoria and New South Wales, through traffic is not possible, and all passengers, luggage and goods had to be transferred between trains. This situation continues till 1962 when the standard gauge line of railway is extended to Melbourne.

1887 - January 19th The Western line is extended to Serviceton and a direct link is established with the South Australian Railways. As both railways were built to the same gauge a through service commences using jointly owned rolling stock. These carriages had considerable influence on later carriages built for the Victorian Railways. Initially known as the 'Intercolonial Express' it was later called the 'Adelaide Express' and, from 1926, 'The Overland". [the former Commissioners Carriage, 'Norman', built as a sleeping carriage in 1890, was based on the design of the 1887 Joint Stock 'Mann Boudoir' Sleeping Cars. 'Norman Car' is a feature of the Museum Collection].

1887/1894 - Large numbers of the pattern locomotives are constructed in Victoria. Most are built by the Phoenix Foundry of Ballarat, but significant orders are also placed with David Munroe and Robinson Bros of Melbourne.

1892 - March 17th. The Economic Boom of the 1880's was replaced by a financial collapse and a resulting depression that lasted for much of the 1890's. The Railway Commissioners were seen to be to blame for the extravagances of the 1880's and they were removed from office on this date and their positions abolished.

1892/93 - In an effort to contain costs a second Rowan Car motor is fitted to a small carriage body and three small tank locomotives are constructed for 'Motor' train operations. Most of these locomotives, were operated by one driver, assisted by a guard, who acted as fireman, and in addition sold tickets. These locomotives were classed as Z class. Two were built by Phoenix Foundry and the other was the first locomotive constructed at the Newport Workshops. This latter locomotive, Z 526 was later converted to a crane locomotive and used at the various locations. It was ultimately restored to original condition and is on display at 'Scienceworks Museum'. [A similar Crane locomotive is displayed in the Railway Museum].

1893 - Two passenger carriages are constructed which incorporate the long body, end platforms, six wheel bogies and side corridor/compartment design of the Joint Stock 'Mann Boudoir' sleeping cars, but built within the design structure of the English based Speight carriages. No additional carriages of this design were built, but they led to the construction of the V Class group of carriages in 1897

1890/1911 - Over this period a number of older locomotives, largely tank engines, were converted for 'motor' operations. The last group being seven of the F class in 1910/11. [Of this group F176 is part of the Museum Collection].

1896 - July 1st A single Railway Commissioner, John Mathieson was appointed. He introduces a policy of financial stringency to reduce deficits, but is unsuccessful in his strenuous opposition of the construction of four 2 foot six inch [760 mm] narrow gauge lines.

1897 - The V Class group of carriages were introduced. While shorter than the 1893 carriages, they included the side corridor/compartment layout and were the first to employ enclosed flexible passage-ways between carriages. Originally these carriages were built for the Victorian section of the 'Sydney Express', and were also used to supplement the Joint Stock vehicles on the 'Adelaide Express'. In addition they were used on main line passenger trains within the state and additional carriages were constructed, based on this design, for use on branch line and mixed trains. These carriages saw their last regular use on the 'Wirth's Circus Train' in the 1950's examples of these and the 1893 carriages are preserved by Steamrail Ballarat.

Victorian Railways History 1900 – 1949 [41]

1900 - As the recovery from the 1890's depression begins to take effect the Victorian Railways commence to expand once more. In addition to the four narrow gauge lines a small amount of extension is made to existing lines and the construction of new locomotives is resumed. Some, such as the AA Class are enlargements of the Speight group of standard 1880's locomotives. These were built by the Phoenix Foundry. But a number of pattern locomotives are also obtained from the Baldwin Locomotive Works of Philadelphia. These include the V Class Goods locomotive of 1900 and the narrow gauge NA Class tank locomotives. Additional locomotives of each class were built in Victoria. The V Class by Phoenix and the NA Class by the Victorian Railway's Newport Workshops. A number of these two classes of locomotives were built as compounds, [i.e. the steam passed through two sets of

cylinders to obtain maximum expansion from the steam, before it was exhausted to the atmosphere] but were later converted to simple expansion. These locomotives marked an important change in construction ideas and a break away from following purely English design concepts.

1900 - Newport Workshops undertakes the rebuild of the M Class group of suburban tank locomotives, dating from 1878.

1901 - The first complete Royal Train was assembled from special purpose vehicles for the visit of the Duke and Duchess of York.

1903 - April 6th The Victorian Railways return to administration by three Commissioners. Thomas Tait is appointed as the Chairman of Commissioners. Tait had been Assistant General Manager of the Canadian Pacific Railway. Thomas Tait also introduced the brown [Canadian Red] livery for locomotives

1902 - The first DD locomotive is constructed at Newport Workshops. Additional locomotives, were constructed in 1903/4, by both Newport and Phoenix Foundry. Ultimately, the Government decided that the Railway Workshops could construct these locomotives at lower cost. From then, until the end of World War 2, the majority of locomotives for the Victorian Railways were constructed in their own workshops. While this marked a 'coming of age' for the workshops, it also spelt the end of locomotive construction by the Phoenix Foundry. The first DD locomotives were very English in appearance, with a narrow cab and low footplates, but by 1904 the design had been modified to include a wide, all metal cab and raised footplates. These changes are usually attributed to Thomas Tait. The DD locomotives were also the first to use the flat topped, Belpaire fire box boiler in Victoria. While the DD locomotives were intended for secondary duties, they introduced a new style of locomotive design to Victoria. Ultimately 263 locomotives of this class were constructed. [Examples of derivatives of the DD Class, D1, D2, D3 and D4 tank locomotives can be found in the Railway Museum].

1906/1912 - Over these years a new fleet of passenger rolling stock is produced. Classed E Class, these vehicles retain the side corridor, compartment design was retained, but the carriages were wider, higher and of similar length to the 1893 carriages. Supported on six wheel bogies, and with an American style of curved end clerestory roof and larger windows, these carriages had a superior layout of the end vestibules. They marked a new era in comfort of long distance travel. Concurrent with their construction, similar style vehicles were constructed as VR/SAR joint stock vehicles, including sleeping cars. Two parlour cars, with an open observation platform at one end were also constructed for the Sydney Express. [one of these parlour cars, 'Yarra' is retained by the Museum, but is maintained in running order by the Seymour Heritage Rail Centre]. A State Car, of similar style was also constructed, and has been used on most Royal Trains since its construction. This car is also held at SHRC along with a running set of E Class carriages. Some were also constructed as combined passenger/mail sorting cars, but were later converted to passenger/guards vans.

1906 - May 7th Victorian Railways electric street tramway service between St Kilda Station and Middle Brighton commences. This service is extended to Brighton Beach on 22nd December.

1907 - A2 Locomotive introduced. This was a larger express passenger development of the DD Class. The initial locomotives were fitted with Stephenson's valve gear and were not superheated. From 1916 the design was modified to include superheating and Walscherts valve gear. These locomotives were the mainstay of passenger workings until the 1950's. They also saw frequent use goods services. [an example of each type of A2 locomotive can be found in the Railway Museum].

1907 - Thomas Tait engages Charles Mertz to report on the possibility of electrifying the Melbourne Suburban Rail system. This report was presented in 1908, but not acted on due to its cost.

1908 - The DDE tank locomotives were introduced, being a tank version of the DD class. They had sufficient range to operate the longest suburban services and sufficient power to deal with the steeper grades of the outer eastern suburbs.

1911 - Mertz is invited to present a revised plan, which is approved in 1912.

1911/1914 - A shorter version of the E Class carriages, classified W Class, are produced. The style and interior layout was virtually the same but the shorter carriages were carried on 4 wheel bogies. From 1924/1925, additional W class carriages were built but with a curved ended elliptical roof

1912 - The first internal combustion powered railcars are introduced. These 'McKeen Cars' were largely unsuccessful due to mechanical failures.

1913 - Newport Power Station is commenced and the construction of a fleet of electric powered trains is commenced. These carriages were of similar outline to the country passenger cars, but had sliding doors to each bay of seats, to allow speedy loading and unloading. In addition, many of the newer suburban passenger carriages of the Speight period were lengthened and strengthened for electric propulsion, but retained their swing doors. These vehicles, which became popularly known as 'Red rattlers', were a part of the Melbourne suburban scene until the 1980's [a swing door motor car is preserved in the museum and operating examples of swing door and Tait cars are preserved by 'Elecrail Victoria']

1913 - A steam powered railcar with a Kerr Stuart power unit and a body built by the Newport workshops entered service.

1918 - C Class heavy goods locomotive introduced. At the time of their introduction they were the largest locomotive in Australia. [a C Class is included in the Museum collection].

1919 - May 28th The first suburban electric passenger service in Australia commenced operation from Essendon to Sandringham. By 1930 all of the then suburban system had been converted to electric operation.

1919 - Alfred Ernest Smith is appointed as Chief Mechanical Engineer. Smith had risen through the ranks of the Victorian Railways and had been closely associated with the design of the DD, A2 and C Class locomotives.

1919 - Harold Clapp is appointed as Chairman of the Victorian Railways Commissioners. A position he retains until 1939.

1919/20 - A series of light weight, high capacity excursion carriages classed BPL were constructed. Using an open saloon design, they were based on the suburban Tait carriages, including the use of sliding doors. Many were built on the under frames of older vehicles and some were fitted with outward swinging doors. A small number were fitted with a guards compartment and were classified BCPL. Some survived in service until the 1980's. A few have found preservation on tourist railways.

1922 - The first K Class locomotives are produced for use on heavily graded light lines. [a K Class is included in the Museum collection].

1922 - The first of a series of rail motors based on AEC truck chassis are introduced. These vehicles were only single ended and had to be turned on a turntable. The last continued in service until the 1950's.

1923 - The first steeple cab suburban electric goods locomotives are obtained. These were followed in 1928 by similar locomotives but with a box cab. They were later Classified as E class.

1925 - Following an agreement, that all new designs of locomotives should be suitable for gauge conversion, by the Australian Railways Commissioners Conference in 1923, a new design of light lines goods locomotives, the N Class, were introduced. These locomotives introduced a trailing truck supporting a wide firebox to Victoria. This allowed the locomotives to use lower quality coal, but their greater length made them too long for some branch line turntables. [an N Class is included in the Museum collection].

1925 - Four double ended Leyland rail motors are obtained.

1926 - Two Garratt type locomotives are obtained from Beyer Peacock for use on two of the narrow gauge lines, Colac to Crowes and Moe to Walhalla. Classified G Class, G42 now operates on the Puffing Billy line.

1923/1928 - Under a Commonwealth agreement a number of lines are extended into New South Wales. The Moama to Deniliquin line is purchased in 1923. In 1926 a branch from Barnes to Balranald is constructed. 1925 Kerang to Murrabit constructed and in 1928 extended to Stony Crossing.

Railway History 1925 – 1949 [41]

1928 - The S Class, 3 cylinder express passenger locomotives are introduced. These locomotives were A. E. Smith's crowning achievement and used bar frames and Gresley conjugated motion to drive the valve of the inside cylinder. Smith retired in this year.

1928 - Additional suburban electric goods locomotives are constructed, but with a box cab design. These were later classified E Class and were popularly known at 'Butter Boxes'.

1928 - A series of petrol-electric railmotors are introduced. These were regarded as successful and continued in service well into the 1980's. In 1951, the original Winton petrol engines were replaced by General Motors diesels and the railmotors became generally known as DERM's. While no DERM is on display in the Museum, several are preserved on tourist railways and one is allocated to the Railway Museum for eventual display.

1929 - The X Class Heavy Goods Locomotives were introduced, designed by A.E. Smiths design team and commenced in the year of his retirement, they were both an adaptation of the C Class to meet the requirement for gauge conversion and a goods equivalent of the S Class.

1929 - The final modification of the DD class, the D3 were produced. With an improved, superheated boiler these largely overcame the steaming problems of the earlier variations. Many of the earlier locomotives were converted to D3. As already noted, one D3 is preserved in the Railway Museum.

1929/1935 - The Great Depression produces a virtual halt in railway development. During this period no new locomotives or carriages were constructed. During the remainder of the 1930's no new locomotives were built and the only new passenger carriages were for the 'Spirit of Progress'.

1934 - Experiments into modified front end drafting by Edgar Brownbill results in modifications being made to many classes of locomotives. These relatively low cost modifications, resulted in considerably improved performance and deferred the construction of new locomotives until World War 2.

1935 - Carriage 36AE is fitted with air-conditioning to become the first air-conditioned carriage in Australia.

1937 - November 23rd S Class locomotives, newly streamlined, with an enlarged tenders on six wheel bogies, begin hauling an all steel bodied, fully air-conditioned train, between Melbourne and Albury. Named the 'Spirit of Progress', this new train was a landmark in the development of the Victorian Railways passenger services. While the interior arrangement of the train retained the traditional compartment arrangement, the location of the end vestibules and toilets differed to earlier designs. The interior styling was based on art nouveau designs used in American carriages of the period, but were carried out using Australian timbers.

1939/1945 - World War 2 has a significant impact on the Victorian Railways. In addition to vastly increased traffic, resulting from the need to move men and munitions to the war zones, a significant proportion of the capacity of Newport Workshops was diverted to the production of war materials ranging from aircraft fuselages, to armoured fighting vehicles, and tug boat hulls. Newport Workshops were also made an assembly point for the ill-fated Australian Standard Garratt [an example of this type of locomotive is preserved in the Railway Museum]. To meet the demands of wartime traffic an additional batch, of the 1922 designed, K Class light goods locomotives were constructed. However, much of the locomotive stock was severely run down and much routine maintenance was deferred.

1941 - H220 introduced to service. Originally conceived as a passenger locomotive to haul the 'Overland' express on the Victorian portion of the journey to Adelaide. The 4-8-4 wheel arrangement copied the latest locomotive practice in the USA, but use of three cylinders, with the valve of the centre cylinder driven by a conjugated lever motion based on European practice. The locomotive incorporated the modified front end designs developed in the mid 1930's and was unusual in having twin funnels. Initially these were placed side by side across the smoke box, but were later arranged longitudinally. Due to weight restrictions on several bridges on the Western Line, which could not be upgraded during the war time emergency, H220 never entered regular service in its planned role, spending all of its service life on the North East line hauling express freight trains. On the few occasions it was used on 'The Spirit of Progress', H220 was easily ably to maintain the schedule in spite of a 100 kph [60 mph] speed limit. Although the frames for two additional H Class were constructed, the locomotives were never completed. [H220 is preserved in the Railway Museum].

As noted above, the demands of World War 2 left the Victorian Railways with a major backlog in maintenance and an additional urgent need for new locomotives to make up for the lack of production in the 1930's

1942/47 - Newport Workshop produced 10 additional locomotives of the X and N Class were produced.

1948/51 - In response to the desire to reduce the number of un-economical mixed train services on lines where there was light traffic, to improve the standard of service provided, and in response to the uncertainties of coal supplies in the post war period; a significant number of additional railcars were purchased from Walkers of Wigan, England. Known as Walker Rail Cars these articulated, lightweight vehicles revolutionised many country services. These railcars came in three sizes and horsepower ratings [102 hp, 153 hp and 280 hp]. While their lightweight design often produced rather spirited riding and the standard of interior fittings left much to be desired by current standards, the success of these units saw them continue in service to the 1970's. [examples of Walker Rail Cars form part of the Museum Collection].

1949 - In 1949, prolonged industrial troubles in the coal mining industry caused the Victorian Railways to launch a major program of conversion of locomotives to use oil as a fuel. All of the C Class, the four S Class and 60 of the A2 Class, being converted. In addition, half of the order for the new J Class

locomotives were built new as oil burners, as were an overseas order for additional N Class. The search for an additional fuel also saw X32 being converted to burn Pulverised Brown Coal. This equipment was later fitted to one of the new R Class [R707]. However, the difficulty of handling this fuel, the costs of providing bulk handling facilities, and the difficulties of training firemen to operate a limited number of locomotives, saw these experiments abandoned, in spite of encouraging results with this fuel.

Victorian Railways History 1950 – 1974 [41]

1950 - Operation Phoenix. As noted above, the demands of World War 2 left the Victorian railways with a major backlog in maintenance and an additional urgent need for new locomotives to make up for the lack of production in the 1930's. Following the report by John Elliot in 1949 a major rehabilitation program was planned involving an expenditure of 80,000,000 pounds over a period of 10 years. This included the purchase of additional locomotives, steam, diesel and electric; the provision of additional a new range of diesel railcars; new suburban electric rolling stock; additional freight rolling stock; and various improvements to track and signalling. Many of the following points were a part of Operation Phoenix. Whilst Operation Phoenix achieved a great deal, major expenditure on steam locomotives at a time of transition to diesel power meant that many steam locomotives were rendered surplus before they had reached the end of their economic life. In addition funding to complete some projects was not forthcoming.

1950/54 - Resulting from a lack of US Dollar exchange funds and a Federal Government Policy favouring contracting overseas construction projects within the British Empire, orders were placed for the construction of additional locomotives of new designs with British manufacturers. In 1950 an additional 50 N Class, of an improved design, were delivered from North British Locomotive Works of Glasgow. In addition, between 1950 and 1951 three additional N Class were built at Newport, but another 16 planned locomotives were not constructed. In 1951 delivery commenced of 70, R Class express passenger locomotives. The R Class were totally new design by the Victoria Railways designers, working in conjunction with North British. They incorporated all of the design features developed by the Victorian Railways design team over the previous two decades. Delivery of the R Class coincided with the first delivery of the first main line diesels and so the R's saw limited use in their intended role, being largely used on freight services. Finally 60 J Class locomotives were delivered from the Vulcan Foundry in England from 1954. These locomotives were intended as a modernised version of the K Class, but with the capability for conversion to standard gauge. As with the K Class, they could operate on all lines with 50 foot turntables. As noted earlier half were supplied as oil burners. [Examples of N, R and J Classes are to be found in the Railway Museum].

1951 - The Victorian Railways purchased a series of 10 diesel electric shunting locomotives from English Electric. 4 additional locomotives of this type were purchased for the State Electricity Commission and these also ultimately passed to the Victorian Railways. Given the designation F Class these locomotives were based on a successful series of locomotives produced by English Electric for the London Midland Railway in the 1930's.

1952 - With improvement in the Australian economy the availability of US dollars increased and the Victorian Government commenced to take delivery of its first main line diesel locomotives. Designated B Class, these General Motors (Electro-motive Division) locomotives were manufactured by Clyde Engineering Co of Sydney, under licence, using engines, traction motors and other electrical components imported from the USA. Given the GM series ML2, the B Class were unique in having a full, A7 styled, cab at both ends and were one of very few classes of GM locos of that era with full controls at each end. At the express wish of the Victorian Railways, they were the first GM main line passenger locomotives to be fitted with the Co-Co wheel arrangement. [The Co-Co wheel arrangement

indicates two six wheel bogies with all axles powered by traction motors]. This gave adequate power for express passenger operations at an axle load that was acceptable for most Victorian main lines.

1953 - As part of the total rehabilitation of the Victorian Railways, plans were prepared for the electrification of the main lines to Traralgon, Geelong, Ballarat and Bendigo. In the event only the Gippsland Line was electrified, but an order was placed for 25, L Class English Electric main line locomotives. Based on a standard EE design these locomotives also featured streamlined drivers cabs at each end. From their introduction they provided most of the services on the Gippsland line. By the end of 1980's the L Class had reached the end of their economic life and, due to the high capital cost of replacements, the decision was taken to abandon electric traction on the Gippsland line.[an example of an L Class locomotive is preserved at the Railway Museum].

1955 - Following on the success of the B Class, the Victorian Railways continued the move to full dieselisation with the purchase of the T Class 875 HP locomotives from Clyde GM. Fitted Bo-Bo [4 wheel bogies with both axles powered by traction motors]. these lightweight locomotives were able to operate on virtually all branches and soon began to replace many of the steam locomotives previously used on these lines. Additional batches of the T Class were ordered with progressive modifications. The original batch had a cab with a low profile. The next order was fitted with a high cab, the next with a low profile nose section. The final orders were fitted with a 950 HP motor and the final batch, had a higher axle load and were geared for continuous low speed operation. These locomotives were specifically intended for heavy shunting duties and were classified as H Class soon after their delivery. [Various examples of the different batches of the T Class are preserved by a number of groups].

1956 - By the early 1950's many of the Tait suburban carriages had been in service for over forty years and some of the swing door carriages dated from still earlier. With the intention of replacing many of these vehicles, the all metal, Harris Trains sets were imported from the United Kingdom. These sets provided improved standards of travel, but the rapid growth of metropolitan Melbourne and the increase in the frequency of services to the outer limits of the suburban services meant that few of the older vehicles were withdrawn from service.

1957 - When the need arose for additional main line diesel locomotives, Victorian Railways again approached Clyde General Motors and purchased a batch of 10 A7 locomotives. Classified as S Class, these locomotives were similar to the NSW 42/421 classes and the second series CR GM Class. The first four locomotives took the numbers and names of the steam S Class. The other locomotives were named after other notable figures in Victorian history. Their success meant that an additional 8 locomotives were purchased by 1968. Two S Class were destroyed in the Southern Aurora collision in 1969, but a number remain in service, largely in secondary roles. Several are earmarked for preservation.

1959 - For much of the steam era, shunting in station yards and short haul branch work, had been carried out by older locomotives, which had been supplanted by more modern equipment. With the phasing out of steam operation, the Victorian Railways sought to find a diesel locomotive that would fill this need. The F Class were based on a 1930's design and were too slow and ungainly for branch work. So in 1959 the W Class Diesel Hydraulic locomotives were purchased from Tullochs of Rhodes in NSW. The W class were not a success with unreliable motors and transmission systems. They were soon relegated to a few major country yards where they could cope with the loads and receive specialised care. In addition three light shunting locomotives were built at the Newport Workshops for specialised purposes. The single V Class for shunting at a carriage washing facility and the two M Class for shunting at Newport Workshops.

1962 - This year saw the first direct linking of Melbourne and Sydney by rail with the opening of the Standard Gauge line from Albury to Melbourne. Launched under the slogan 'Its Thru in 62', this link saw the beginning of a rapid increase in freight traffic between the two state capitals and the introduction of a new luxury train, the 'Southern Aurora'. In addition the 'Spirit of Progress' and the 'Intercapital Daylight' were extended to operate between Melbourne and Sydney on the standard gauge.

1963 - The search for a suitable shunting locomotive was solved when the Victorian Railways turned to Clyde GM. A 600 hp power unit was mounted on bogies reconditioned from scrapped suburban motor carriages, to produce a unit which had both sufficient power, flexibility and speed to carry out all but the heaviest yard shunting, operate on the lightest of branches and sidings; and if required, could be used for transfer work and short distance mainline services. Classified as Y Class. These locomotives came to be seen all over the system.

1966 - The unprecedented growth in freight traffic on the Standard Gauge line and the phasing out of most of the steam fleet saw the Victorian Railways experiencing on-going shortages of diesel motive power. To meet this need, the first of the X Class Diesels were purchased from Clyde GM. While these locomotives were internally similar to the S class, they adopted the unstreamlined hood design, which provided for greater ease of maintenance. The success of the X class saw additional units delivered in 1970. These later X Class saw an increase in horsepower to 2000hp. Two of the locomotives were nominally regarded as replacements for two of the S class that were written off in the 'Southern Aurora' accident in 1969. Finally ten additional X class were delivered in 1975, which featured improved electrical equipment and a modified cab design. The X Class continue to give good service and currently a number have been fitted with 3000hp engine units rendered surplus by an engine upgrade to the G Class diesels. These modified X Class locomotives are currently being classified XR.

1969 - The 'Southern Aurora' and a freight train involved in a head on collision at Violet Town.

1971 - While the Harris cars delivered from 1956 were intended to replace a significant number of the elderly Tait cars, continued growth of Melbourne's population meant that many of these cars continued in service alongside the Harris Cars. This growth also meant that some sets of the even older swing door cars remained in service. Experiments with several longer bodied Harris trailer cars led to the introduction of the Hitachi Electric Trains in 1971. The popular name of these cars came from the use of Hitachi electrical equipment in these cars. In fact, these cars were built by Martin and King, while Newport Workshops built 50 of the trailer cars, with the electrical equipment being supplied by Commonwealth Engineering to Hitachi designs. These cars had longer bodies but retained the traditional configuration of Motor cars, Trailer cars and Driver trailer cars which allowed the operation of trains in two, three, four and seven car configurations. Following a major industrial dispute, related to driver safety in the Driver trailer cars, the driver compartments of the trailer cars were closed off and they continued in service as Trailer cars. With the introduction of new car designs in the 21st Century the Hitachi cars are beginning to be phased out of service.

1972 - The Bland Report recommended major changes to the structure and operations of the Victorian Railways. This included replacement of the Railway Commissioners with the Victorian Railways Board and the closure of a significant number of unprofitable branch lines. Associated with this was a significant reduction in the number of employees. A G (Bill) Gibbs was appointed the first chairman of the Board.

1971/1981 - After many years of discussion and debate the Melbourne Underground Loop was constructed. Under the auspices of the Melbourne Underground Loop Authority [MURLA] the loop

was constructed with minimal disruption to the existing suburban train systems. The Loop resulted in three additional stations serving the CBD and considerably eased pressure on Flinders Street Station and increased the capacity of the suburban system. One side effect of the opening of the Loop was the final withdrawal of the Tait wooden-bodied cars, for wooden-bodied cars were not permitted to operate in the Loop in normal service.

Victorian Railways History 1975 – 1999 [41]

1976 - The name Victorian Railways was replaced by Vicrail

1976 - Regional Freight Centres were established and this in turn triggered the closure of numerous country branch lines as Vicrail ceased to handle less than car load lots [LCL]

1977 - As through freight on the main interstate corridors continued to grow, it became evident that through working of freight services would soon follow. The C Class Diesels, supplied by Clyde GM, were specifically designed to meet this purpose and to remove the need for using multiple locomotive groups on individual trains. With 3000hp, the C Class marked a considerable increase in motive power for the Victorian Railways. They were fitted with sufficient fuel capacity to complete a round trip to Adelaide without refuelling. Mechanically similar to the West Australian Railways, L class, several of which had operated in Victoria on hire, the C Class were distinguished by a unique cab design. Unfortunately, concerns were raised about the weight of the C Class and limits were placed on their speed and they were only permitted to operate with partially full fuel tanks. In spite of this the C Class fulfilled a useful role in interstate freight service and some continue to operate today. C501 has been restored by the Seymour Railway Heritage Centre and can be seen in freight service for Pacific National.

1978 - Lonie Report recommended the abolition of all country passenger services except for the Geelong/Melbourne corridor. The State Government in response to the report set out to revitalize passenger services. Over the following years, but the report possibly contributed to the loss by the Liberal Government in 1982.

1980 - Alan Reiher was appointed Chairman of the Victorian Railways Board, replacing Bill Gibbs who had retired. Alan Reiher had previously been the head of the Public Transport Commission of NSW.

1981 - In the same year as the last of the Hitachi cars were delivered, an order was placed for a new design of Suburban trains. These cars were built by Commonwealth Engineering at Dandenong and the popular name came from the Comeng logo that was displayed inside the cars. These cars marked a return to British electrical equipment which was supplied by General Electric. These cars introduced air-conditioning, carpeted floors and vandal resistant fabric covered seat cushions to suburban commuter services. The delivery of these cars saw the final withdrawal of the last of the wooden body Tait cars in 1984. It had originally been intended to refurbish all of the Harris cars to the same a similar standard, but the cost of the refurbishment, coupled to the need to completely gut the cars for asbestos insulation removal made this impractical. Only 16 cars were thus treated, but saw little service due to industrial problems. As noted elsewhere 61 cars were converted for locomotive hauled outer commuter service. [Examples of the unmodified and modified Harris Cars can be found in the Railway Museum]. Apart from a few individual cars damaged by fire or by accidents, all of the Comeng fleet continue in service.

1982 - Through running of locomotives into Victoria commences. While train crews continued to change at the borders, this facilitated the operation of Superfreighter services between states.

1983 - In an additional administrative reorganisation, the Victorian Railways Board was replaced by two bodies. The Metropolitan Transit Authority, and the State Transit Authority. These two bodies traded as the MET and V/Line respectively and were responsible to the Director General of Transport. This position was held by Alan Reiher.

1984 - A Class and P Class Conversions Under the re-organisation of passenger services, announced in 1983, services were to be provided by fixed sets of steel, air-conditioned cars. To provide motive power for these services two classes of older locomotives were to be upgraded to operate these services. The ageing B Class were to be rebuilt with 2500 hp engines for the Interurban services. These rebuilds, were undertaken by Clyde Engineering, at their South Australian plant. In order to accommodate the lager engine units, the roofline of the locomotives was raised and modified, but the original cabs were retained. The rebuilt locomotives were classified A, but retained their original numbers. In practice it was found that the cost of conversion was almost equivalent to a new locomotive and so the program was suspended after the eleventh conversion was completed. With the arrival of new locomotives [N Class] the A Class were no longer exclusively used in passenger service, some ultimately passing to Freight Australia. For shorter distance commuter services a number of the first series T Class were selected for rebuilding. In their original form the flat top T Class were not noted for their good riding at speed and limited visibility. When rebuilt as P Class, by Martin and King at Somerton, a raised cab and modified front end gave them a similar appearance to the final group of T class, riding problems were overcome and the locomotives were equipped to provide 'head end power to single set of H cars. The original concept had been for the P Class loco to be permanently coupled to one end of a car set and operate in a 'push/pull' mode. Safety concerns and union objections saw this idea dropped. However, where traffic required two H car sets to be coupled, a second P Class will be attached to the rear of the train to provide power for the second set of cars.

1984 - N Class and H Class Carriage Sets. The decision to drastically re-organise country passenger services came shortly after the Granville Disaster in NSW and a similar accident at Laverton, which fortunately involved far fewer casualties. Both however pointed to the need to rapidly withdraw all wooden body passenger rolling stock. This set V/Line the problem of obtaining additional steel body, air-conditioned passenger stock with minimum delay. For longer distance, Interurban services, designs of the 1950's Z Cars were modified to include a fully welded structure, retention toilets and improved modern air-conditioning units. To provide power for these facilities the initial cars were fitted with an underfloor diesel motor and alternator set. As locomotives with 'head end' power became available, these cars were modified to use this power source, or to switch between either. The most recent modification allows for this and for the car set to use only as many power generation sets as the conditions demand. These new cars were given a classification N. As they usually operate in fixed sets they are also referred to as N Sets. Over subsequent years, older S and Z Cars were brought up to these standards. Some of these cars had operated on the standard gauge until the withdrawal of locomotive hauled passenger trains between Melbourne and Sydney. For many years the shorter distance commuter services, outside the electrified area, had used antiquated high capacity wooden stock and a collection of ageing railcars. To replace these a number of the newer suburban Harris trailer cars were totally rebuilt to provide relatively high density, air-conditioned accommodation, with limited retention toilet facilities. These cars were equipped to operate on 'head end' power only drawn from the locomotive. As with the N Cars, the H Cars were semi-permanently coupled into fixed sets. Both the N sets and H stets, continue to provide service on their intended services.

1984 - While the A Class conversions were seen to be a success, it was recognised that they were a short-term measure. As it became evident that the cost of conversions almost equalled the cost of a new locomotive, orders were placed for totally new passenger power. These were the N Class and

deliveries commenced in 1984. Named after various Rural Cities, the N Class were built by Clyde Engineering at Campbellfield, near Melbourne, and incorporated the latest high power output, fuel efficient General Motors engine units, in the same power range as the A Class, coupled with Clyde EMD traction motors that were developed in Australia. Fitted with 'head end' power capability, these locomotives can be found at the head of most of the long distance passenger trains in Victoria. The N Class maintained the Victorian predilection for twin cab locomotives. In the period immediately prior to the conversion of the western line to standard gauge, one or two N Class could often be found operating the Overland to Adelaide. While privatisation of rail services has seen the N class loose this role, they are capable of gauge conversion and have sufficient fuel capacity to operate to Adelaide and return.

1984 - The CANAC report saw the reorganisation of grain transport services in Victoria. The number of receival points was drastically reduced and all non-bogie wagons were withdrawn from service.

1984 - The 1980's saw considerable advances in diesel freight locomotives world-wide. Victorian Railways had moved into the 3000 hp field with the C Class, but using what was effectively 1960's technology. So, the G Class Locomotives delivered in 1985 marked a major advance in technology. The G Class had a mixed pedigree, being an on-run of the Australian National BL class, which in turn had been derived from the NSW 81 Class. All featured a full cab design with driving stations at both ends. All were in the 3000hp range and incorporated the latest in diesel and electrical technology. Both the BL and the G classes had a cleaner appearance to the 81 as the main girder frames were concealed under the exterior cladding. The weight saving meant that with a major track upgrades, the G Class are able to operate over most of the system and this resulted in major changes to the handling of grain and other commodities in most parts of the state. This in turn spelt the end of service many of the lighter line locomotives that had previously handled this traffic. Subsequent to privatisation, the G Class passed to Freight Australia/Pacific National and have seen service on the main East West and North South freight corridors. Under Freight Australia a program of engine upgrades was commenced, the recycled engines being passed down to X Class locomotives.

1986 - The Southern Aurora and the Spirit of Progress were both withdrawn and replaced by the 'Sydney/Melbourne Express'.

1987 - The St Kilda and Port Melbourne Lines were converted to Light Rail (tram) operation. These lines had not been part of the Loop operations and had witnessed falling patronage over the preceding decades.

1991 – 'Intercapital Daylight' withdrawn.

1993 - The introduction of high speed rail cars, 'Sprinters' in this year marked a change in V/line Passenger operations. Previously V/Line Passenger had relied on locomotive hauled sets. The Sprinters were ordered in 1991 and were built by Goninans of Newcastle, but with many components provided by the Bendigo Railway Workshops, who were also responsible for the final fitting out. Sprinters were named after Victorian athletes. This continued a pattern established with the A Class locomotives, named after Victorian footballers, and the N Class, named after Victorian Regional Cities. Several G Class were also named after locations in the wheat belt of the state.

1993/1995 - Under Commonwealth legislation the National Rail Corporation was established and commenced operations through Victoria. Commonwealth funding enabled the link between Melbourne and Adelaide to be converted to standard gauge. The route selected for conversion was the Western Plains line, via Geelong, Gheringhap, Maroona and Ararat. In addition the line from Ararat

to Portland, Ararat to Maryborough, and all branches beyond Ararat were also converted, allowing movement of grain to Portland.

1993 - A night XPT service commences between Melbourne and Sydney.

1993 - In a response to the reorganisations the two major railway unions, the Australian Railways Union and the Australian Federated Union of Locomotive Enginemen, joined with the Transport Officers Federation to form the Public Transport Union. This union ultimately changed its name to the Rail Tram and Bus Union in 1998, in response to the privatisation of services.

1993 - V/Line was broken into V/Line Passenger and V/Line Freight.

1993 - Passenger services to a number of destinations were cut, to be replaced by buses. These included Sale to Bairnsdale, Seymour to Cobram, Ballarat to Ararat and Dimboola, Ballarat and Mildura, and Geelong to Warrnambool. Of these services, Hoys Roadlines chose to operate a rail service between Melbourne and Shepparton, with a bus connection to Cobram while The Victorian Railway Company, trading as West Coast Railway, operated the Melbourne to Warrnambool service. West Coast Railway were to operate for ten years and were innovative in introducing a modernised R Class steam locomotive to operate some services.

1994 - Daylight XPT services commence between Melbourne and Sydney.

1994 - Victorian PTC relinquishes any links with the operation of interstate services. So XPT services are operated by Countrylink. The Overland was operated by Australian National and from 1997 by Great Southern Railway.

1995 - Suburban trains services extended to Cranbourne.

1996 - V/Line Freight Corporation set up along with the Victorian Rail Track Corporation.

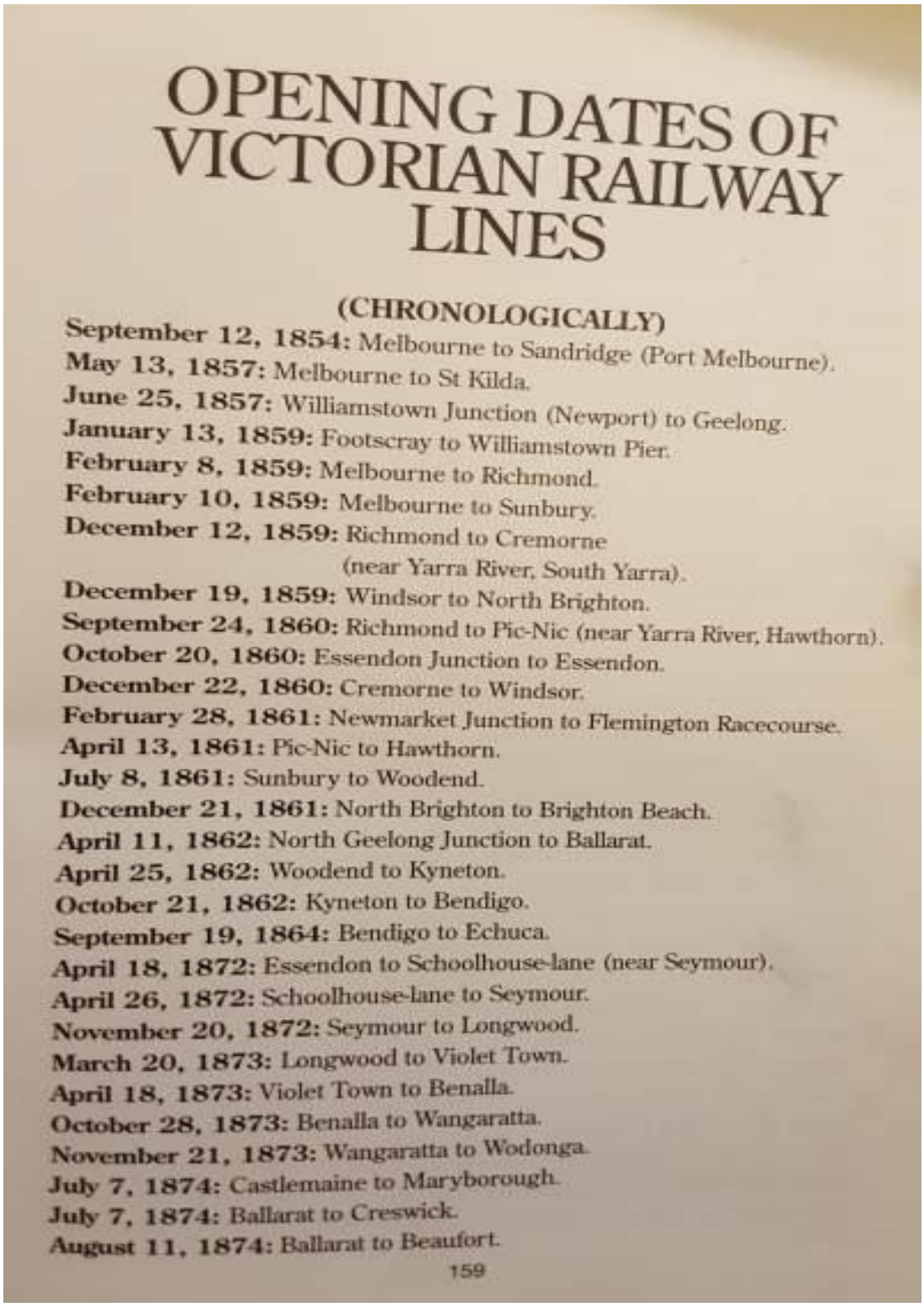
1997 - Full privatisation of all Public Transport services. V/Line Passenger was established as a corporation and the Met was broken into two corporate entities, Hillside and Bayside Trains. All were offered for franchise sale following a Transport strike during the 1997 Grand Prix.

1997 - Control over all interstate standard gauge lines in Victoria passed to the Australian Rail Track Authority [ARTC].

1998 - V/Line Freight was offered for sale and VicTrack was offered on a 45 year lease to the purchaser. This resulted in the purchase of V/Line Freight by Freight Victoria in early 1999. In order to promote its national focus the company name was changed to Freight Australia.

1999 - Privatisation of rail services completed with the British company, National Express gaining the franchises for V/Line Passenger and Bayside Trains. Hillside Trains passed to the French Connex Group. Connex applied their name to Hillside Trains, while Bayside Trains become known as M Train. Both undertook upgrade programs on the Comeng Cars, but to different standards.

Appendix 5: Opening and Closing Dates of Victorian Railways [42]



OPENING DATES OF VICTORIAN RAILWAY LINES

(CHRONOLOGICALLY)

September 12, 1854: Melbourne to Sandridge (Port Melbourne).
May 13, 1857: Melbourne to St Kilda.
June 25, 1857: Williamstown Junction (Newport) to Geelong.
January 13, 1859: Footscray to Williamstown Pier.
February 8, 1859: Melbourne to Richmond.
February 10, 1859: Melbourne to Sunbury.
December 12, 1859: Richmond to Cremorne (near Yarra River, South Yarra).
December 19, 1859: Windsor to North Brighton.
September 24, 1860: Richmond to Pic-Nic (near Yarra River, Hawthorn).
October 20, 1860: Essendon Junction to Essendon.
December 22, 1860: Cremorne to Windsor.
February 28, 1861: Newmarket Junction to Flemington Racecourse.
April 13, 1861: Pic-Nic to Hawthorn.
July 8, 1861: Sunbury to Woodend.
December 21, 1861: North Brighton to Brighton Beach.
April 11, 1862: North Geelong Junction to Ballarat.
April 25, 1862: Woodend to Kyneton.
October 21, 1862: Kyneton to Bendigo.
September 19, 1864: Bendigo to Echuca.
April 18, 1872: Essendon to Schoolhouse-lane (near Seymour).
April 26, 1872: Schoolhouse-lane to Seymour.
November 20, 1872: Seymour to Longwood.
March 20, 1873: Longwood to Violet Town.
April 18, 1873: Violet Town to Benalla.
October 28, 1873: Benalla to Wangaratta.
November 21, 1873: Wangaratta to Wodonga.
July 7, 1874: Castlemaine to Maryborough.
July 7, 1874: Ballarat to Creswick.
August 11, 1874: Ballarat to Beaufort.

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[42] Marc Fiddian Marc. Trains, tracks, travellers: a history of the Victorian railways. 1997.

October 6, 1874: Maryborough to Dunolly.
November 16, 1874: Creswick to Clunes.
February 2, 1875: Clunes to Maryborough.
April 7, 1875: Beaufort to Ararat.
July 7, 1875: Beechworth Junction to Everton.
February 15, 1876: Ararat to Scanlan's Hill.
April 14, 1876: Scanlan's Hill to Stawell.
September 19, 1876: Bendigo to Bridgewater.
September 30, 1876: Everton to Beechworth.
October 21, 1876: Maryborough to Avoca.
November 18, 1876: Bridgewater to Inglewood.
November 25, 1876: Geelong to Winchelsea.
March 13, 1877: Winchelsea to Birregurra.
April 24, 1877: Ararat to Dunkeld.
June 1, 1877: Sale to Morwell.
July 27, 1877: Birregurra to Colac.
October 8, 1877: Oakleigh to Bunyip.
October 29, 1877: Dunkeld to Hamilton.
December 1, 1877: Moe to Morwell.
December 19, 1877: Hamilton to Portland Pier.
February 1, 1878: Geelong to racecourse spur.
March 1, 1878: Moe to Bunyip.
September 3, 1878: Dunolly to Bealiba.
December 17, 1878: Stawell to Murtoa.
December 23, 1878: Bealiba to St Arnaud.
January 29, 1879: Springhurst to Wahgunyah.
February 5, 1879: Murtoa to Horsham.
April 2, 1879: South Yarra to Oakleigh.
May 7, 1879: Warrenheip to Gordon.
May 21, 1879: Geelong to Queenscliff.
January 13, 1880: Mangalore to Shepparton.
January 13, 1880: Toolamba to Tatura.
February 16, 1880: Carlsruhe to Trentham.
March 17, 1880: Trentham to Daylesford.
June 7, 1881: Lancefield Junction to Lancefield.
August 11, 1881: Ballarat racecourse spur.
September 1, 1881: Shepparton to Numurkah.

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December 19, 1881: Caulfield to Mordialloc.
January 26, 1882: St. Arnaud to Cope Cope.
April 3, 1882: Hawthorn to Camberwell.
April 15, 1882: Inglewood to Korong Vale.
April 22, 1882: Cope Cope to Donald.
July 1, 1882: Horsham to Dimboola.
August 1, 1882: Mordialloc to Frankston.
December 1, 1882: Camberwell to Lilydale.
December 15, 1882: Eaglehawk to Raywood.
April 20, 1883: Korong Vale to Charlton.
June 14, 1883: Wodonga to Murray River.
June 21, 1883: Raywood to Mitiamo.
July 2, 1883: Korong Vale to Boort.
July 2, 1883: Colac to Camberdown.
August 1, 1883: Ballarat to Scarsdale.
September 3, 1883: Benalla to St. James.
October 1, 1883: Charlton to Wycheproof.
November 13, 1883: Traralgon to Heyfield.
November 16, 1883: Tallarook to Yea.
December 17, 1883: Everton to Myrtleford.
February 2, 1884: Mitiamo to Pyramid Hill.
February 15, 1884: Branxholme to Henty.
April 2, 1884: Braybrook Junction to Melton.
June 16, 1884: Castlemaine to Maldon.
September 1, 1884: Henty to Casterton.
September 9: 1884: North Melbourne to Coburg.
October 25, 1884: Pyramid Hill to Kerang.
April 6: 1885: Williamstown racecourse spur.
April 10, 1885: Morwell to Boolarra.
September 8, 1885: Boolarra to Darlimurla.
January 1, 1886: Lal Lal racecourse spur.
January 7, 1886: Darlimurla to Mirboo North.
April 1, 1886: Melton to Parwan.
May 6, 1886: St. James to Yarrawonga.
May 12, 1886: Murtoa to Warracknabeal.
November 15, 1886: Ballarat cattle yards spur.
December 22, 1886: Gordon to Ballan.

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January 19, 1887: Dimboola to Serviceton.
January 19, 1887: North Creswick to Rocky Lead.
February 16, 1887: Parwan to Bacchus Marsh.
March 18, 1887: Heyfield to Maffra.
April 21, 1887: Wedderburn Junction to Wedderburn.
April 23, 1887: Camperdown to Terang.
June 1, 1887: Rocky Lead to Daylesford Junction.
June 1, 1887: Lubeck to Rapanyup.
August 19, 1887: Tatura to Echuca.
August 25, 1887: Horsham to Noradjuha.
September 2, 1887: Brighton Beach to Sandringham.
September 24, 1887: Braybrook Junction to Newport.
November 8, 1887: Maffra to Stratford.
December 19, 1887: Hawthorn to Kew.
May 8, 1888: Royal Park Junction to Clifton Hill.
May 8, 1888: Clifton Hill to Collingwood.
May 8, 1888: North Fitzroy to Fitzroy (goods line).
May 8, 1888: Clifton Hill to Heidelberg.
May 8, 1888: Moe Junction to Thorpdale.
May 8, 1888: Sale to Bairnsdale.
May 15, 1888: Lilydale to Yarra Flats.
October 1, 1888: Numurkah to Nathalia.
October 1, 1888: Numurkah to Cobram.
October 1, 1888: Shepparton to Dookie.
October 1, 1888: Kilmore Junction to Kilmore.
October 1, 1888: Bendigo to Heathcote.
October 1, 1888: Pisgah Junction to Waubra.
October 1, 1888: Frankston to Mornington Junction.
October 1, 1888: Dandenong to Tooradin.
November 20, 1888: Inglewood to Dunolly.
November 20, 1888: Hamilton to Coleraine.
March 1, 1889: Yarra Flats to Healesville.
August 7, 1889: Maffra to Briagalong.
August 7, 1889: Irrewarra to Beeac.
September 10, 1889: Mornington Junction to Mornington.
September 10, 1889: Mornington Junction to Hastings.
September 10, 1889: Wodonga to Huon Lane.

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September 12, 1889: Ballarat East to Buninyong.
October 8, 1889: Whittlesea Junction to Preston Reservoir.
October 8, 1889: Coburg to Somerton.
November 12, 1889: Yea to Molesworth.
December 3, 1889: Heathcote to Tooborac.
December 4, 1889: Bacchus Marsh to Ballan.
December 4, 1889: Ringwood to Upper Ferntree Gully.
December 17, 1889: Hastings to Stony Point.
December 23, 1889: Preston Reservoir to Whittlesea.
February 4, 1890: Terang to Mortlake.
February 4, 1890: Terang to Port Fairy.
March 17, 1890: Mount Moriac to Wensleydale.
March 24, 1890: Burnley to Oakleigh.
May 12, 1890: Warragul to Rokeby.
May 30, 1890: Kerang to Swan Hill.
May 30, 1890: Camberwell to Waverley Rd. (East Malvern).
June 17, 1890: Molesworth to Cathkin.
July 18, 1890: Huon Lane to Bolga.
August 22, 1890: Kilmore to Tooborac.
August 22, 1890: Dunkeld to Koroit.
August 22, 1890: Hamilton to Penshurst.
September 1, 1890: Murchison East to Rushworth.
September 16, 1890: Cathkin to Alexandra Rd.
October 10, 1890: Scarsdale to Linton.
October 17, 1890: Myrtleford to Bright.
November 10, 1890: Cathkin to Merton.
November 11, 1890: Tooradin to Loch.
November 18, 1890: Ararat to Avoca.
January 15, 1891: Kyneton (Redesdale Junction) to Redesdale.
March 24, 1891: Fairfield Park to Riversdale.
March 24, 1891: Maldon (Laanecoorie Junction) to Shelbourne.
May 7, 1891: Merton to Maindample.
June 2, 1891: Loch to Korumburra.
June 5, 1891: Birregurra to Forrest.
July 23, 1891: Beechworth to Yackandandah.
July 24, 1891: Bolga to Tallangatta.
October 6, 1891: Maindample to Mansfield.

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November 23, 1891: Flinders St. to Spencer St.
December 17, 1891: Korumburra to Leongatha.
January 13, 1892: Leongatha to Port Albert.
March 18, 1892: Rokeby to Neerim South.
April 5, 1892: Curdie's River Junction to Timboon.
April 6, 1892: Lancefield to Kilmore.
October 28, 1892: Korumburra to Coal Creek.
November 22, 1892: Dookie to Katamatite.
January 5, 1893: Warracknabeal to Beulah.
March 28, 1893: Donald to Birchip.
March 6, 1894: Beulah to Hopetoun.
May 7, 1894: Korumburra (Jumbunna Junction) to Jumbunna.
May 14, 1894: Bendigo cattle yards spur.
June 1, 1894: Korumburra (Strzelecki Junction) to Strzelecki.
June 19, 1894: Dimboola to Jeparit.
July 31, 1894: East Natimuk to Goroke.
August 7, 1894: Boort to Quambatook.
March 8, 1895: Wycheproof to Sea Lake.
February 5, 1896: Jumbunna to Outrimm.
December 15, 1896: Nathalia to Picola.
March 14, 1899: Wangaratta to Whitfield (narrow gauge).
September 18, 1899: Birchip to Woomelang.
November 2, 1899: Jeparit to Rainbow.
March 1, 1900: Quambatook to Ultima.
December 18, 1900: Upper Ferntree Gully to Gembrook (narrow gauge).
December 26, 1900: Bungaree racecourse spur.
October 21, 1901: Melbourne to Collingwood.
November 13, 1901: Lilydale to Warburton.
March 1, 1902: Colac to Beech Forest (narrow gauge).
June 5, 1902: Heidelberg to Eltham.
January 15, 1903: Woomelang to Hattah.
May 25, 1903: Hattah to Nowingi.
September 30, 1903: Nowingi to Yatpool.
October 27, 1903: Yatpool to Mildura.
December 21, 1903: North Geelong loop line.
January 1, 1904: Burrumbeet racecourse spur.
February 7, 1904: Springvale Cemetery spur.

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December 5, 1904: Northcote loop line.
February 28, 1905: Strathmerton towards Tocumwal, 8.20 miles.
June 26, 1905: Welshpool to Welshpool Jetty (narrow gauge).
June 26, 1905: Stawell to Grampians.
July 9: 1908: Strathmerton to Tocumwal extension.
June 15, 1909: Rupanyip to Marnoo.
July 1, 1909: Ultima to Chillingollah.
October 28, 1909: Alexandra Rd. to Alexandra.
May 3, 1910: Moe to Walhalla (narrow gauge).
May 9, 1910: Nyora to Woolamai/Powlett coal field.
July 4, 1910: Mildura to White Cliffs.
December 1, 1910: Beeac to Cressy.
June 20, 1911: Beech Forest to Crowes (narrow gauge).
September 25, 1911: Cressy to Newtown.
June 25, 1912: Ouyen to Kow Plains/Murrayville.
June 25, 1912: Eltham to Hurst's Bridge.
September 24, 1912: Noradjuha to Toolondo.
December 10, 1912: Jeparit to Lorquon.
August 8, 1913: Gheringhap to Maroona.
January 28, 1914: Chillingollah to Manangatang.
May 28, 1914: Crowland to Navarre.
June 26, 1914: Rainbow to Nypo (towards).
June 29, 1914: Sea Lake to Pier-Millan (towards).
June 30, 1914: Benalla to Tatong.
August 26, 1914: Rushworth to Colbinabbin.
May 27, 1915: Swan Hill to Piangil.
July 29, 1915: Murrayville to South Australia border.
November 1, 1915: Hamilton to Cavendish.
November 10, 1915: Elmore to Cohuna.
January 17, 1916: Linton to Skipton.
April 10, 1916: Bairnsdale to Orbost.
June 13, 1916: Tallangatta to Shelley.
June 20, 1916: Heywood to Dartmoor.
June 27, 1916: Lorquon to Yanac-a-Yanac.
March 27, 1917: Neerim South to Nayook.
May 15, 1917: Rushworth to Gigarre (Stanhope North).
November 28, 1917: Dartmoor to South Australia border.

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December 17, 1917: Toolondo to Kanagulk.
September 9, 1918: North Geelong to Fyansford.
April 10, 1919: Shelley to Beetomba.
April 28, 1919: Nayook to Noojee.
May 28, 1919: Nandaly to Mittyack.
June 16, 1919: Kangulk to Balmoral.
March 24, 1920: Piangil to Kooloonong (Pine Tank).
June 16, 1920: Mittyack to Kulwin.
November 19, 1920: Cavendish to Balmoral.
February 8, 1921: Alberton to Yarram.
March 8, 1921: Manangatang to Annuello.
May 5, 1921: Beetomba to Cudgewa.
December 12, 1921: Bittern to Red Hill.
December 16, 1921: Yarram to Won Wron.
June 11, 1922: Herne's Oak to Yallourn.
June 29, 1922: Kooweerup to Strzelecki.
June 21, 1923: Colac to Alvie.
June 22, 1923: Won Wron to Woodside.
December 1, 1923: Moama to Deniliquin.
April 11, 1924: Red Cliffs to Millewa North.
June 5, 1924: Annuello to Robinvale.
October 1, 1924: Altona Bay railway.
December 20, 1924: Kerang to Gonn Crossing.
May 6, 1925: Hopetoun to Patchewollock.
June 27, 1925: Merbein to Abbotsford.
October 30, 1925: Werrimull to The Hut.
March 26, 1926: Moama to Balranald.
March 29, 1926: Kooloonong to West Narrung.
May 3, 1927: Goroke to Morea (Carpolac).
July 25, 1927: Marnoo to Wallaloo.
October 31, 1927: Bowser to Peechelba.
March 16, 1928: Murrabit to Stony Crossing.
October 21, 1928: South Kensington to West Footscray (goods).
February 29, 1929: Darling to East Malvern.
May 5, 1930: East Malvern to Glen Waverley.
August 15, 1938: Yarrawonga to Oaklands.
May 25, 1960: Moe to Yallourn.

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February 19, 1962: Upper Ferntree Gully to Belgrave (broad gauge).
April 2, 1969: Welshpool to Barry Beach.
April 29, 1969: Tyabb to Long Island.
January 24, 1981: City Loop (underground).
February 27, 1986: Webb Dock line.

CONVERSIONS FROM BROAD TO STANDARD GAUGE

May 18, 1995: Portland-Ararat, Murtoa-Hopetoun, Dimboola-Yaapeet (grain lines).
June 4, 1995: Melbourne-Adelaide.

CLOSING DATES OF LINES

October 3, 1857: Newport to Greenwich.

May 1, 1862: St. Kilda to Windsor.

July 1, 1864: Newmarket to Flemington Racecourse.
(Reopened October 30, 1867).

August 14, 1890: Williamstown Racecourse to Altona Beach.
(Reopened to Altona in 1916 for military purposes and on December 1, 1917 for passengers).

April 12, 1893: Riversdale to Fairfield Park.
(Reopened from Riversdale to Deepdene, May 14, 1900; Deepdene to East Kew, February 11, 1925; the latter section for goods only).

December 9, 1895: Ashburton to Oakleigh. Darling to Waverley Rd. (Ashburton-Alamein section reopened June 8, 1948).

May 1, 1897: Ashburton to Camberwell.
(Reopened July 4, 1898).

February 19, 1898: Dunkeld to Penshurst. (Last train ran on March 25, 1891).

July 13, 1903: Coburg to Somerton.
(Reopened from Coburg to Fawkner Cemetery on December 12, 1906 and to Somerton on March 5, 1928).

July 14, 1903: Lancefield to Kilmore.

May 28, 1909: Geelong Racecourse spur.

June, 1911: Black Diamond Junction to Strzelecki.

June 1919: Kilmany Park tramway.

November 22, 1930: Triholm to Strzelecki.

August 31, 1931: Black Rock to Beaumaris (VR standard gauge tramway).

July 1, 1940: Lal Lal Racecourse spur.

January 1, 1941: Welshpool to Port Welshpool (VR narrow gauge tramway).

August 7, 1941: Yannathan to Triholm.

August, 1942: Bairnsdale wharf spur beyond 171 miles, 55 chains.

February 12, 1943: Robinvale to Koorakee.

September 9, 1943: East Kew to Riversdale.

February 22, 1944: Warrnambool pier spur beyond 167 miles.

April 1, 1944: Platina to Walhalla.

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March, 1947: Eureka to Buninyong.

July 1, 1947: Benalla Oil Siding to Tatong.

July 1, 1948: Burrumbeet Racecourse spur (last train ran November 1, 1941).

October 20, 1948: Moriac to Wensleydale (last train ran in 1945).

February 14, 1949: Alberton to Port Albert.

March 29, 1949: Stawell to Grampians (last train July 23, 1942).

April 15, 1950: Bayles to Yannathan.

May 22, 1950: Williamstown Racecourse spur (no service beyond 1940 when races ceased there).

August, 1950: Bairnsdale wharf (171m, 21ch to 171m, 55ch).

May 10, 1951: Black Diamond Junction to Black Diamond (traffic continued until November, 1954).

September 4, 1951: Jumbunna to Outrimm (last train June 2, 1941).

September 4, 1951: Bungaree Racecourse spur (traffic ceased December 26, 1940).

December 19, 1951: Springvale Cemetery spur.

October 14, 1952: Erica to Platina.

October 21, 1952: Maffra to Briagolong.

November 4, 1952: Wonthaggi to Eastern Area.

May 25, 1953: Yarram to Woodside.

July 1, 1953: Bittern to Red Hill (trains ran to the up side of the Balnarring level crossing for Lord Somers camp until January, 1956. Last train an ARHS special, ran on February 25, 1956).

July 28, 1953: Newlyn to Daylesford Junction.

October 1, 1953: Korumburra to Jumbunna.

October 12, 1953: Wangaratta to Whitfield (owing to bushfire damage in February, 1952 locomotives stopped at Moyhu and a ganger's trolley hauled traffic to Whitfield).

November 18, 1953: Irrewarra to Newtown.

February 24, 1954: Ben Nevis to Navarre.

March 27, 1954: Nayook to Noojee.

April 30, 1954: Upper Ferntree Gully to Gembrook.

(Farewell specials ran to Belgrave from December 11, 1954 to February 23, 1958; reopened to Belgrave on February 18, 1962 as a broad gauge line. Narrow gauge section reopened to Menzies Creek on July 28, 1962, to Emerald on July 31, 1965 and to Lakeside on October 18, 1975).

June 25, 1954: Moe to Erica.

July 2, 1954: Beechworth to Yackandandah.

September 26, 1954: Redesdale Junction to Redesdale.

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December 10, 1954: Ferguson to Crowes.
(Reopened to Weeaprohinah January 19, 1955).
December 18, 1954: Colac to Alvie.
July 1, 1955: Port Fairy wharf spur.
May 5, 1956: Fawkner to Somerton.
(Reopened Somerton to Ford Siding July 19, 1959; reopened Fawkner to Upfield on August 17, 1959; Somerton-Ford Siding converted to dual gauge January 11, 1963).
August 13, 1956: Clarkefield to Lancefield.
November 5, 1956: Sandringham to Black Rock (standard gauge VR tramway).
January 1, 1957: Park St., Brighton, to Brighton Beach (broad gauge VR tramway).
March 4, 1957: Birregurra to Forrest.
March 31, 1957: Hernes Oak to Yallourn.
May 13, 1957: Hawthorn to Kew.
July 1, 1957: Harwood St. to Park St. (broad gauge VR tramway).
August 5, 1957: Kooloolong to Yungera.
October 1, 1958: Warragul to Nayook.
December 3, 1958: Rangelea to Heathcote.
December 4, 1958: Moe to Thorpdale.
February 4, 1959: Kooweerup to Bayles.
February 28, 1959: St. Kilda station to Harwood St. (broad gauge VR tramway).
April 15, 1959: Kooweerup to Coal Creek.
May 13, 1959: Cheetham's Siding to Queenscliff.
(Reopened November 16, 1959).
July 8, 1959: Avoca to Ararat.
(Reopened October 29, 1966).
November 29, 1959: Thomastown to Whittlesea.
(Reopened from Thomastown to Lalor November 30, 1959 and Lalor to Epping November 30, 1964).
June 30, 1962: Colac to Weeaprohinah.
February 5, 1964: Kerang to Stony Crossing (service between Murrabit and Stony Crossing suspended in 1943; Kerang-Murrabit service suspended on April 20, 1961 after Barr Creek bridge collapsed under engine J512).
March 19, 1964: Meringur to Morkalla (last train ran on June 2, 1959).
June 30, 1964: Macleod to Mont Park.

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May 2, 1965: North Fitzroy to Rushall.
May 21, 1965: North Fitzroy to Northcote Loop.
July 13, 1965: State Coal Mine (Wonthaggi to Dudley).
July 29, 1965: Lilydale to Warburton (ARHS special ran August 1, 1965).
February 1, 1968: Ballarat Racecourse to Waubra.
May 1, 1968: Echuca wharf spur.
May 6, 1968: Portland North to Portland.
November 7, 1968: Heathcote Junction to Heathcote (ARHS special November 9, 1968).
December 28, 1968: Wonthaggi to Kirrak.
January 1, 1970: Shelbourne Junction to Shelbourne.
April 17, 1970: Waubra Junction to Ballarat Racecourse.
November 1, 1970: Yallourn to Yallourn North.
March 21, 1973: Mildura wharf spur.
May 29, 1973: Spotswood to Newport Power House.
June 24, 1974: Morwell to Mirboo North.
March 1, 1975: Stanhope to Gigarre (line put out of action several months earlier because of floods).
November 6, 1976: Cheetham Siding to Queenscliff.
December 1, 1976: Allendale to Newlyn.
December 3, 1976: Castlemaine to Maldon.
December 30, 1976: Everton to Beechworth (ARE special on January 3, 1977).
September 12, 1977: Dennington to Port Fairy.
September 12, 1977: Koroit to Coleraine Junction.
September 12, 1977: Hamilton Livestock Siding Junction to Coleraine.
September 12, 1977: Branxholme to Casterton.
February 6, 1978: Deer Park to Ravenhall.
July 3, 1978: Carlsruhe to Daylesford.
August 1, 1978: Mortlake Junction to Mortlake.
November 8, 1978: Tallarook to Mansfield.
November 8, 1978: Cathkin to Alexandra.
November 21, 1978: Nyora to Wonthaggi.
July 1, 1979: Noradjuha to Hamilton.
April 14, 1980: Broadmeadows to Broadstore.
March 1, 1981: Bandiana to Cudgewa (last regular goods April 21, 1978).
March 1, 1981: Diggora West to Cohuna.
March 1, 1981: Kerang to Koondrook.

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March 15, 1981: Coldstream to Healesville.
June 15, 1981: Baxter to Mornington.
June 22, 1981: Long Island Junction to Stony Point.
(Reopened September 16, 1984).
June 22, 1981: Crib Point to Naval Base.
(Reopened for MPRS on January 9, 1989).
July 31, 1981: Royal Park to Fitzroy.
October 28, 1983: Lubeck to Bolangum.
November 30, 1983: Myrtleford to Bright.
December 16, 1983: Sale wharf spur.
1984/85: South Geelong to Cheetham Siding.
September 27, 1985: Linton Junction to Skipton.
December 1, 1986: Ballarat East to Eureka.
December 8, 1986: Timboon Junction to Timboon.
December 8, 1986: Hopetoun to Patchewallock.
December 8, 1986: North Creswick to Allendale.
December 8, 1986: Jeparit to Yanac.
December 8, 1986: East Natimuk to Noradjuha.
December 8, 1986: Moulamein to Balranald (services suspended).
December 8, 1986: Wedderburn Junction to Wedderburn.
December 8, 1986: Elmore to Diggora West.
December 8, 1986: Piangil to Kooloonong.
December 8, 1986: Dookie to Katamatite.
December 8, 1986: Nurmurkah to Picola.
December 8, 1986: Bowser to Peechelba East.
December 8, 1986: Moe to Yallourn (overhead traction dismantled 1979).
December 8, 1986: Traralgon to Cowwarr (no traffic beyond July 19, 1985 after Latrobe River bridge was badly scoured).
March 25, 1987: Williamstown to Williamstown Pier.
April 13, 1987: Bowser to Myrtleford.
August 1, 1987: Melbourne (Flinders St.) to St. Kilda.
August 21, 1987: Bairnsdale to Orbost.
August 31, 1987: Cowwarr to Maffra.
August, 1987: Warrnambool to Woollen Mill Siding.
October 11, 1987: Melbourne (Flinders St.) to Port Melbourne.
October 12, 1987: Murchison East to Colbinabbin.
October 12, 1987: Rushworth to Stanhope.

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October 26, 1987: Welshpool to Yarram.
April 27, 1988: Benalla to Benalla Oil Siding.
September 14, 1988: Nowingi towards Millewa South.
October, 1988: Horsham to East Natimuk (last train ran in July, 1987).
December, 1988: Red Cliffs to Meringur.
May 29, 1990: Bendigo North to Rangelea.
May, 1990: Barry Beach Junction to Welshpool.
December 10, 1991: Lilydale to Coldstream.
June 30, 1992: Leongatha to Barry Beach.
September 14, 1993: Geelong wharf spur.
February 6, 1995: Maffra to Stratford Junction (services susp.).
April 14, 1995: Heywood to Mount Gambier (services susp.).
April 14, 1995: Linton Junction to Ararat (services susp.).
July 1, 1995: Springhurst to Wahgunyah (services susp.).

- This list is exclusive of lines serving docks in Melbourne, ballast lines and line sections closed because of deviations, such as those on the Cudgewa, Mansfield and Castlemaine-Maryborough lines in the 1950s. It also excludes lines converted from broad to standard gauge.

Appendix 6: Historic Individuals or Association

Charles Heber Perrin

Charles Heber Perrin started as a junior draftsman at the Victorian Railways on 28 August 1885. Through his hard work, he climbed the corporate ladder from junior engineer up to becoming the Chief Engineer on the Railway Construction Branch in 1923 until 1932. His works include the Flinders Street Station, Murray River bridges, Walhalla narrow gauge railway, Bairnsdale to Orbost and Gheringhap to Maroona Railways, South Kensington to West Footscray goods line and the Maribyrnong River Viaduct on the Albion to Broadmeadows line [43].

Figure 43 - Charles Heber Perrin [44]

[43] Museum of Victoria. Victorian Railways. http://museumvictoria.com.au/railways/theme.aspx?lvl=3&IRN=492&gall=540

[44] Engineers Australia Magazine. December 2014. Vol.1 No.5. 2014.

James Cameron

James Cameron is from Scotland that migrated with his family to Australia at an early age. During his younger years, James and his brothers leased Dean's Marsh to cultivate some crops. However, due to bad weather, harvests were not good forcing them to look for other work.

James married Sarah Scouller and lived in Lochiel together with their eight children. He became a Shire Councillor representing Orbost in the Bairnsdale Shire and latter part of Tambo Shire in 1882 until 1892. Then, he became the Shire President in 1886 and 1891.

In 1892, he became the first president of Croajingolong Shire. Then, the Croajingolong Shire was changed to Orbost Shire in February 17, 1893. James Cameron was very passionate in developing the East Gippsland and with his efforts the railway line from Bairnsdale to Orbost was constructed, and the dual bridge was built across the Snowy River.

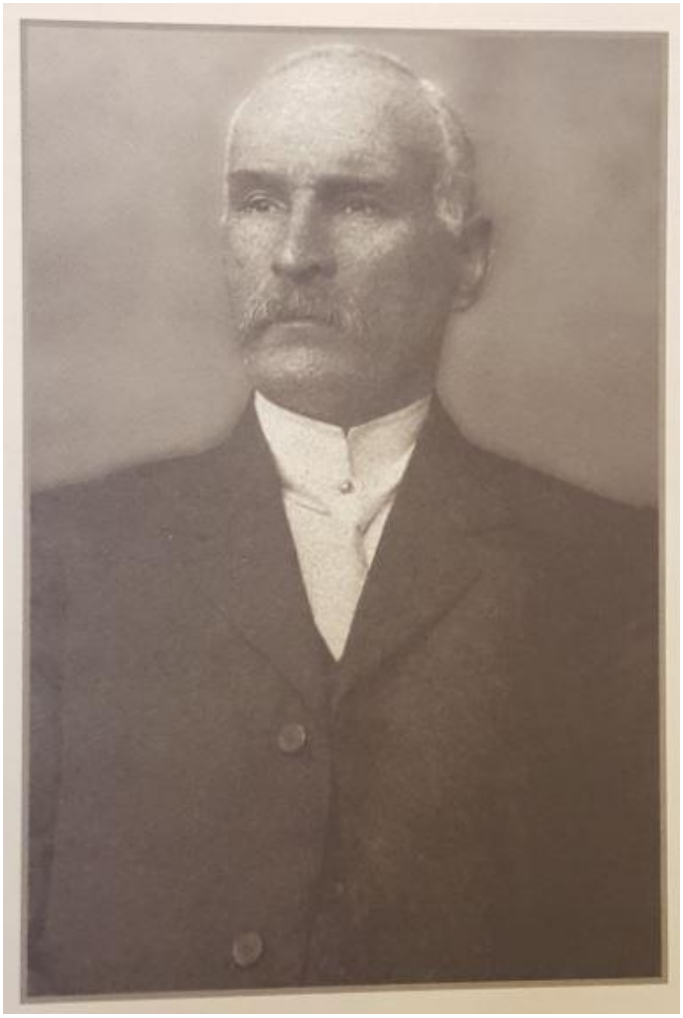


Figure 44 - James Cameron Error! Bookmark not defined.

Maurice E Kernot

Maurice Edwin Kernot (1852-1934) was born on 10 June 1852 at Geelong and educated at the Gheringhap Street State School and the High Church School, of which he was dux.

Matriculating in 1869, he did not complete his engineering course at the university but worked 'on the job' with the Water Supply Department, the Mines Department, and from 1874 the Railways Department. Kernot married Caroline Grace Home in 1880. He achieved some distinction in his career as a railway engineer, being 'the first to apply the principles of technical analysis to railway location in Victoria', and achieved large savings through his administration of the 'butty gang' or 'direct labour' system, which replaced the letting of large contracts in the 1890s. While he was engineer-in-chief of the Victorian Railways from 1907 to 1923, over 1000 miles (1609 km) of railways were built.

In 1914 Maurice Kernot investigated railway practice in Europe and America and he was active, especially after retirement, in the affairs of the Institution of Engineers, Australia, being awarded its Peter Nicol Russell medal in 1933; he was also awarded the Kernot memorial medal in 1928.

Kernot was an active member of the Presbyterian Church, a methodical man with a sense of humour and simple tastes. He died on 13 January 1934 and was cremated. He was survived by his wife, a daughter and a son Charles Home Kernot (1885-1958), who became chief engineer of the State Electricity Commission of Victoria.

Another brother, Frederick Archer Kernot (1854-1920), dentist, actively aided the transition of dentistry from a trade to a profession, served on the Dental Board of Victoria and the council of the Australian College of Dentistry, and took some part in the establishment of the original Dental Hospital in Melbourne. He was also a well-known amateur photographer [45].

[45] Australian Dictionary of Biography. Maurice Edwin Kernot. http://adb.anu.edu.au/biography/kernot-maurice-edwin-7097

Wilfred Noyce Kernot [45]

Wilfred Noyce Kernot (1868-1945) was the brother of Maurice Edwin Kernot and was born on 18 July 1868 at Newtown, Geelong, Victoria, and attended the Flinders School. He matriculated at the university in 1885, and graduated BCE in 1894 (M Mech Eng, 1918), meanwhile being appointed in 1891 as a lecturer in applied mechanics at the Working Men's College, Melbourne (later Royal Melbourne Institute of Technology and RMIT University). On the establishment of the important day-diploma courses in 1898 Kernot became head of the college's engineering department, a position he retained with distinction; in 1901 he was one of the two highest-paid members of staff, on £380 a year.

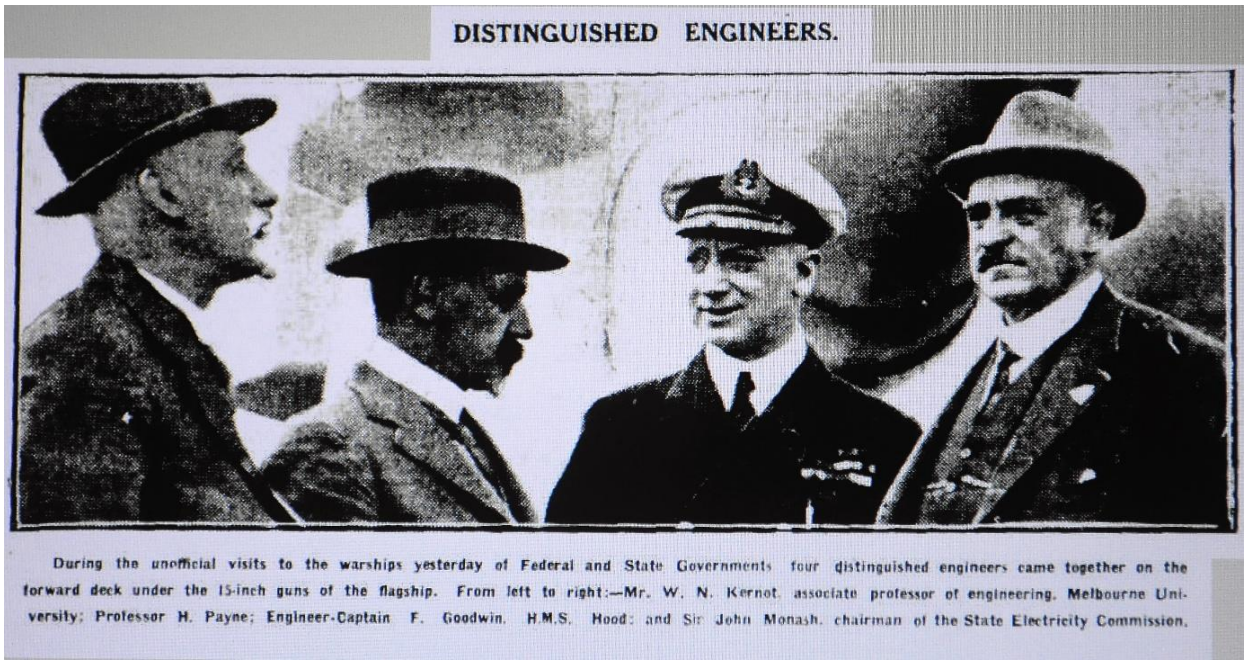
In 1904-05 Kernot travelled to the United States of America and to Europe, investigating high-voltage transmission and engineering education. From about 1909 conditions at the Working Men's College became increasingly unpleasant, with internecine strife and attacks on the administration from the reinforced 'business' element on the college's council, and in 1911 Kernot resigned to join the staff of the engineering school at the university, where he had for some time been undertaking responsible part-time work. His departure from the Working Men's College was regretted in technical education circles.

Kernot became associate professor in engineering in 1923, and from 1932 to 1936 was professor, in succession to Henry Payne. Kernot's appointment to the chair came just fifty years after his brother's appointment to the same position.

At the university Kernot specialized in the teaching of graphics and engineering design, with a reputation as an able teacher and administrator. His lecture on 'Mechanical Paradoxes', employing ingenious home-made devices, is still remembered, as is his nick-name 'Crunch', from his mannerism of muttering and grinding his teeth. He had strong extramural interests. He was a director of the New Australian Electric Company, of which his brother William had been chairman from its foundation in 1882 until 1900, and where he was known as the 'trouble man'; with A G Thomas he won a competition for the design of a swing-bridge over the Yarra at Spencer Street, and he designed several other bridges and irrigation works; he was employed as a consultant by such instrumentalities as the Metropolitan Gas Company, the Defence Department, the Commonwealth Public Works Department and the Council for Scientific and Industrial Research. Kernot was recognized as an expert on patents, electric tramways and power generation, but worked widely over the fields of mechanical, civil and electrical engineering. Professor Charles Moorhouse, one of his students, has called him 'one of the last of the general engineers'.

Kernot was also active in the organization of the engineering profession, and was president of the Institution of Electrical Engineers of Australia (Melbourne) in 1917, as well as acting federal president; president of the Working Men's College (1920); and was administratively associated with CSIR, the Royal Society of Victoria, the Institution of Civil Engineers (London) and Caulfield Technical School. At the university he was dean of the faculties of engineering and architecture.

After retirement Wilfred Kernot acted as examiner to Melbourne technical colleges and spent much time in his well-equipped home workshop at Malvern, where his interest in clocks led to his constructing gearing for time signals from the Melbourne Observatory. His personality was regarded as humorous, patient, kindly and jovial. He died, unmarried, of coronary vascular disease on 17 May 1945 and was cremated, leaving the considerable fortune of £71,943, spread over a number of careful investments [45].



DISTINGUISHED ENGINEERS.

During the unofficial visits to the warships yesterday of Federal and State Governments four distinguished engineers came together on the forward deck under the 15-inch guns of the flagship. From left to right:—Mr. W. N. Kernot, associate professor of engineering, Melbourne University; Professor H. Payne; Engineer-Captain F. Goodwin, H.M.S. Hood; and Sir John Monash, chairman of the State Electricity Commission.

Figure 45 – Wilfred Noyce Kernot, Associate Professor of Engineering at the University of Melbourne, Professor H Payne, Engineer-Captain F Goodwin and Sir John Monash on board HMS *Hood* in 1924. *Image: The Argus, Melbourne, 21 March 1924, page 7, courtesy of Trove.*

William Charles Kernot [46]

Figure 45 - William Charles Kernot [46]

William Charles Kernot (1845-1909), engineer and educationist, was born on 16 June 1845 at Rochford, Essex, England, eldest son of Charles Kernot. Kernot subscribed to the tradition that the family was of Huguenot extraction, the name being a variant of the French 'Carnot' (although Kernot was not normally pronounced as a French word). He arrived with his family at Geelong in 1851 and attended Christ Church School and at the Flinders National School came under the influence of George Morrison, to whom Kernot wrote 'I owe an untold debt of gratitude'. Admitted at 15 he had a 'happy and satisfactory' career in the University of Melbourne (BA, 1864; MA, 1866); by gaining the certificate of civil engineering in 1866 he became the first qualified engineer to be produced by the university, though he thought little of the course. He also gained a master of civil engineering in 1898.

Kernot's experience from 1865 to 1875 was to colour his approach to professional education. In 1865 through political influence he secured a post in the Department of Mines at a time of intense pressure of routine work checking land leases. His qualifications were 'as useless as a punkah would be at the South Pole', and after eighteen months he was dismissed. In 1867 he was appointed to water supply, in amiable surroundings but among men who 'as far as I could discern were perfectly unconscious even of the existence of physical laws'. When this office was disbanded he moved to the Department of Railways for some six months in 1870, finding there that the engineer-in-chief, Thomas Higinbotham, 'never missed an opportunity of impressing upon me the uselessness and undesirability of University training for engineers', and then returned to a reconstituted water-supply office, finally resigning from government service in 1875.

[46] Australian Dictionary of Biography. William Charles Kernot. http://adb.anu.edu.au/biography/kernot-william-charles-556

Kernot had been appointed part-time lecturer in surveying at the university in 1868, and next-year received a similar appointment in civil engineering. Increasing classes at the university and growing returns from students' fees largely motivated his resignation from the public service. He claimed that 'at once' he discovered that, with consulting work, he could make several times his government pay. In 1882 the utilitarian 'schoolmaster' element on the university council succeeded in establishing four new chairs on the basis of 'favouring local men and appointing them without overseas competition'; in 1883 he became professor of engineering, the first in the university. Next year the first graduates in engineering, as distinct from holders of the 'certificate', appeared.

One of the earliest examples of Kernot's 'outside' work was his association for some years from 1876 with Louis Brennan in developing early models of the steerable torpedo. In 1887 he sent Kernot £500 'as a slight expression of the inestimable service rendered by you' in the 'early and most trying stages of the invention'. In 1878 Kernot had visited Europe, inspected many engineering schools and industrial establishments and become acquainted with leading scientists and engineers. On his return to Melbourne he worked with assiduity as chairman of two juries, and member of another, at the International Exhibition of 1880; although handsomely thanked, Kernot refused to undertake similar duties at the 1888 exhibition, being convinced of 'the impossibility of arriving at thoroughly reliable and satisfactory awards'. In 1884 he accepted an invitation to join a New South Wales royal commission on railway bridges, thus involving himself in two years of part-time work. In 1888 he reported on railway bridges in the Derwent valley for the Tasmanian government and took part in a Victorian inquiry into the undergrounding of telephone and telegraph wires in the metropolitan area. In 1891 he again visited Europe and went on to North America, where he inspected many engineering schools and colleges, with a view to building an adequate engineering school for the University of Melbourne at his own expense; Kernot ruefully recalled that this project was negated by the 'great slump'. In 1892 he was chairman of an inquiry into the locomotive and rolling-stock branch of the Victorian Railways, and later claimed, probably justly, that his advice on the balancing of locomotives was saving the government more than its annual subvention to the University of Melbourne. He published numerous scientific papers, his most important work being *On Some Common Errors in Iron Bridge Design* (1898). In 1901 he again travelled to England, France, Germany and South Africa. To the 1903 royal commission on the University of Melbourne he testified that he spent twenty-three hours a week in lecturing to, or close association with, his students.

To these public and academic duties Kernot added his broader concerns with engineering and education. He was president of the Royal Society of Victoria in 1885-1900 and virtually a permanent member of its council; he was active in the Victorian Institute of Engineers (president 1886, 1890, 1897-98 and 1906-07) and the Victorian Institute of Surveyors (president 1883-84). On Francis Ormond's death in 1889 he became for ten very difficult years chairman of the council of the Working Men's College, an institution he once unfortunately referred to as 'University and water', but he fought fiercely for its independence. Kernot's *Address* to the college's annual demonstration in 1894 is, like many of his surviving speeches and lectures, noteworthy for its freedom from cant, its espousal of educational principles modern even eighty years later and its pungency. 'Payment by results' he termed 'a system admirably adapted to the cure of smoky chimneys, but most fatal in its effects on cloudy intellects'. On another occasion (but also with reference to the college) he remarked that the democratic atmosphere of a university 'altogether unfits men for submitting to the despotism either of a Russian Czar or a Victorian Education Department'. From his own funds he contributed generously to his institutions: in 1887 he provided £2000 for scholarships in physics and chemistry at the university; in 1893 he gave £300 for a foundry at the Working Men's College and in 1901 another £300 to that institution; in 1902 he donated £1000 towards a metallurgical laboratory at the university and in 1908 a further £200 for a scholarship in geology.

In areas of broader scientific and social concern, Kernot became in 1886 an inaugural member of the Australian Antarctic Committee, set up jointly by the Royal Society of Victoria and the Victorian branch of the Geographical Society of Australasia, the members of which, according to R A Swan, 'played a vital role as trail-blazers for the future exploration of the Antarctic continent'. In the same year Kernot was chairman of the board of arbitrators in the waterfront strike, his successful work being recognized by an address presented to him jointly by the Employers' Union and the Trades Hall Council, 'expressing the esteem and satisfaction of both bodies of his impartiality'. In 1903, while deploring 'the extreme Socialistic tendency' and even offering his and his students' services as strike-breakers during the railway engine-drivers strike, he firmly stated his sympathy 'with all the wants, ambitions and trials of the so-called workingman'. He was also an active member of the Baptist Union of Victoria (President 1902-03) and a staunch free trader.

Kernot was probably best known as what a later generation would call a 'stirrer'; indeed, his character and influence cannot be assessed without examining the stiff sense of professional dignity and ethics which led him into many disputes. His early humiliations in the public service made him a relentless scourge of bureaucratic incompetence and nourished a sense of self-righteousness in his many campaigns for safety, economy and the application of scientific principles in public works. He sternly lectured, in forthright categories, government and municipal engineers when he found faults in their designs, especially when these menaced public safety, and referred to the 'ordinary ignorant empiric who calls himself an engineer'. In the late 1880s he launched a long but successful campaign to have the railways admit the weaknesses in the important Moorabool viaduct near Geelong, and he had a lifelong interest in flood control on the Yarra and Barwon Rivers. Among many other battles he dedicated himself to a lengthy campaign against the anti-academic bias of the prestigious Institution of Civil Engineers in Britain, and to a similar fight against the scientific and anti-theoretical approaches of government departments in appointing and promoting engineers and surveyors.

Kernot often told his students that 'I freely admit many mistakes and much weakness on my part, and … regret that my position was not held by some one of sturdier and less sensitive nature, better fitted than I for a career of continual conflict', but there seems little need to take this very seriously. By his autumn years he could point to honoured scars and draw comfort from many victories since the day when he was, in his own words, 'the first man that the University sent out to attack single handed the fortress of professional ignorance and prejudice'. He participated with immense energy in both social and professional life and believed strongly that material progress would lead to 'the evolution of a wiser, kinder, and more sympathetic race'. His disposition was benign, and his popularity considerable with students, colleagues and the public. However, his school of engineering was in some ways a disappointment; it lacked the munificent private backing of the Sydney school. Kernot had to battle deep-seated prejudice against the academically-trained engineer, and the depression of the 1890s, coming when he was at his peak, sadly affected his plans for development. He was criticized by some witnesses at the royal commission on the University of Melbourne (1902-04), and claims were made that his courses were 'superficial', purely descriptive and lacking in analytical and mathematical rigor. Perhaps more seriously, he threatened a member of his own staff who gave evidence critical of the school and secured his removal from academic employment, matters which properly angered the commissioners. However, degree courses in mining engineering (1901) and mechanical engineering (1907) were introduced before Kernot died, while electrical engineering (1912) had long been one of his ambitions. He can fairly be credited with laying sound foundations for the expansion of engineering in the University of Melbourne that took place after his death. More importantly, his spirited extramural sorties and his long campaign for the status of the engineer both within the profession and outside it were a necessary preliminary to the development of adequate academic courses at the

university and elsewhere. Here lies his significance, and a large measure of justification for the claim made for him as 'the first Australian engineer'.

In 1880 Kernot had built a large and comfortable house, Firenze, on Royal Parade, Parkville, and there he lived out his life unwed but in company with others of his family. He was of comfortable means, mainly due to his consulting and industrial interests: in 1882 he, James Service and F. Pirani introduced electric light to Melbourne through the New Australian Electricity Company, with Kernot as chairman of directors (1882-1900). He was of pleasing eccentricity: he built a fabled 'velocipede', forerunner of the bicycle, about 1869 and claimed the record for a penny-farthing journey to Geelong; he was an enthusiast for ballooning; and in his later years he was still youthful enough to drive in a student procession his well-known steam car disguised as a locomotive. He died unexpectedly at his home on 14 March 1909. A younger brother, Wilfred Noyce, was professor of engineering at the University of Melbourne in 1932-36.

Deakin held Kernot eminent in his profession and known for 'his sense of justice and kindness'. Scott has written of his 'unruffled generosity and kindness', and Blainey has apostrophized him as 'Kindly and plump, wearer of the broadcloth'. *In My Life* Story (1924) Arthur Lynch claims him as the only professor he knew at the University of Melbourne 'devoid of that detestable academic exclusiveness and starchiness', and tells how he stood for an hour under Kernot's old umbrella with him at a street corner while the rain poured, listening spellbound to a disquisition on the properties of iron. [46]

Appendix 7: Images and Captions

Photographic History of the Bairnsdale to Orbost Railway Line.

- **First train on the Orbost-Bairnsdale line, East Gippsland, 1914.**

- **Description:** The First Train on the Orbost to Bairnsdale Line. It Is Crossing A Trestle Bridge. There Is A Maize Crop In The Background.
- **Location:** East Gippsland, Victoria, Australia
- **Date:** 1914

- **Subjects:** Maize, Agricultural Produce, Rail Vehicles, Bridges, Steam Locomotives

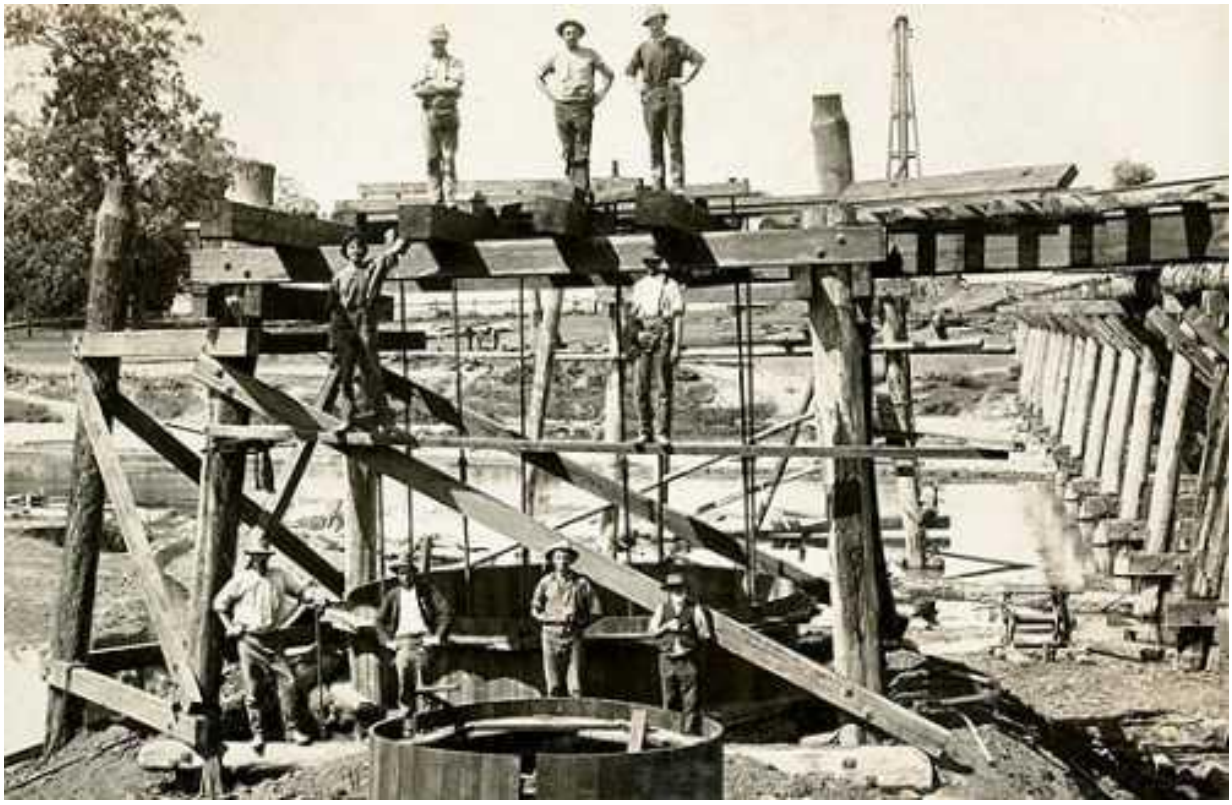
- **Collection:** The Biggest Family Album In Australia
- **Collection Number:**5741
- **Medium:** Negatives - Copy
- **Source:** Museum Victoria
- **Record No.:** Mm005733

- **Construction Staff, Bairnsdale-Orbost Line, 1914.**

- **Inscription:** Railway Construction, Orbost.
- **Description:** Dumping Ballast into Railway Trucks on The Orbost To Bairnsdale Line.
- **Location:** Orbost District, Victoria, Australia
- **Date:** 1914

- **Subjects:** Rail Transport, Horsedrawn Vehicles, Rail Trucks, Railway Workers

- **Collection:** The Biggest Family Album In Australia
- **Collection Number:**5846
- **Medium:** Negatives - Copy
- **Source:** Museum Victoria
- **Record No.:** MM005837

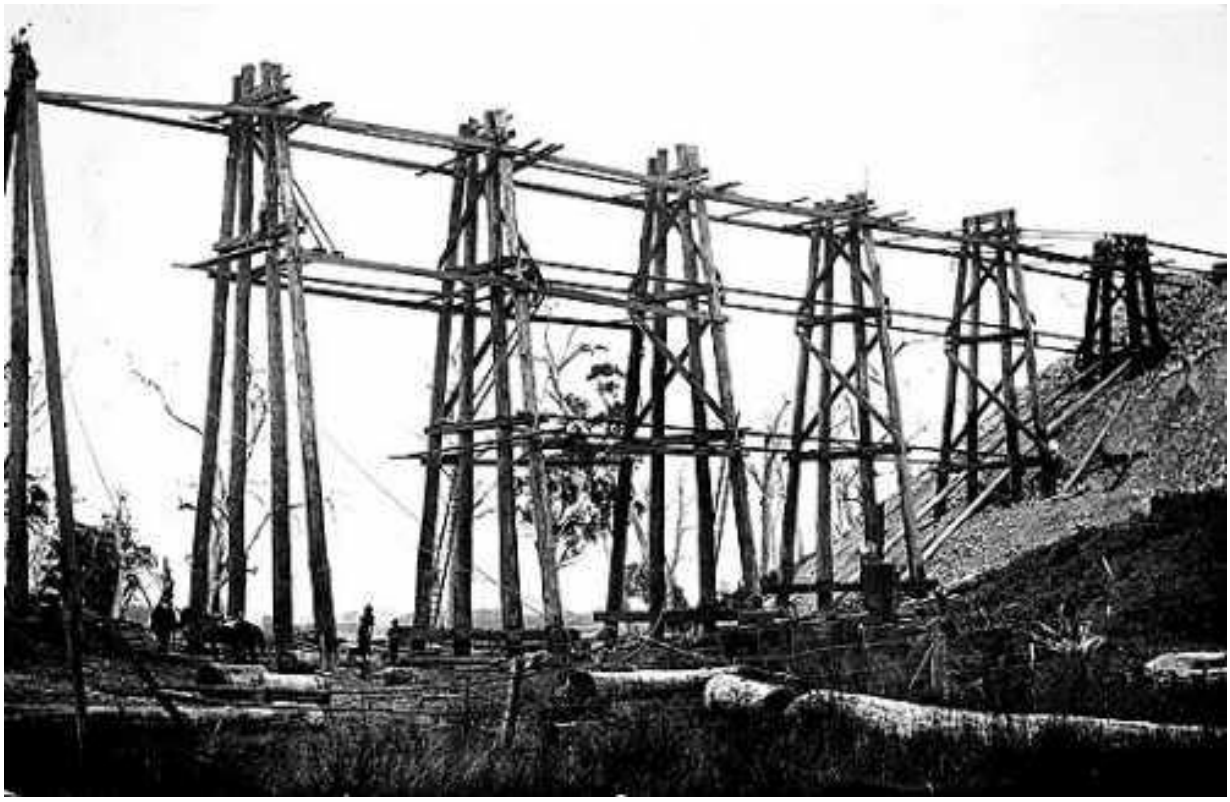


- **“Bairnsdale to Orbost. Tambo River Bridge, 1914. Concrete Forms - Pier No. 3**

- **Inscription:** Bairnsdale to Orbost. Tambo River Bridge, 1914. Concrete Forms - Pier No. 3
- **Description:** Construction of Pier 3 of the Tambo River railway bridge. The outer timber form for the concrete pour is in place. Formwork is suspended from timber staging by threaded metal rods used to jack formwork up as concreting progresses. A temporary timber construction bridge on the right is joined to the timber staging. A pile driving derrick is visible in the background and there is a small crab winch on the river bank to the right.
- **Location:** Bairnsdale, Victoria, Australia
- **Date:** 1914

- **Other Names:** Victorian Railways; Tambo River
- **Subjects:** Bridge Construction, Concrete Laying, Scaffolding, Lifting Equipment, Pile-Driving Derricks, Crab Winches

- **Collection:** Charles H. Perrin Album
- **Collection Number:**62
- **Medium:** Albums - Photographs
- **Source:** Museum Victoria
- **Record No.:** MM069308”

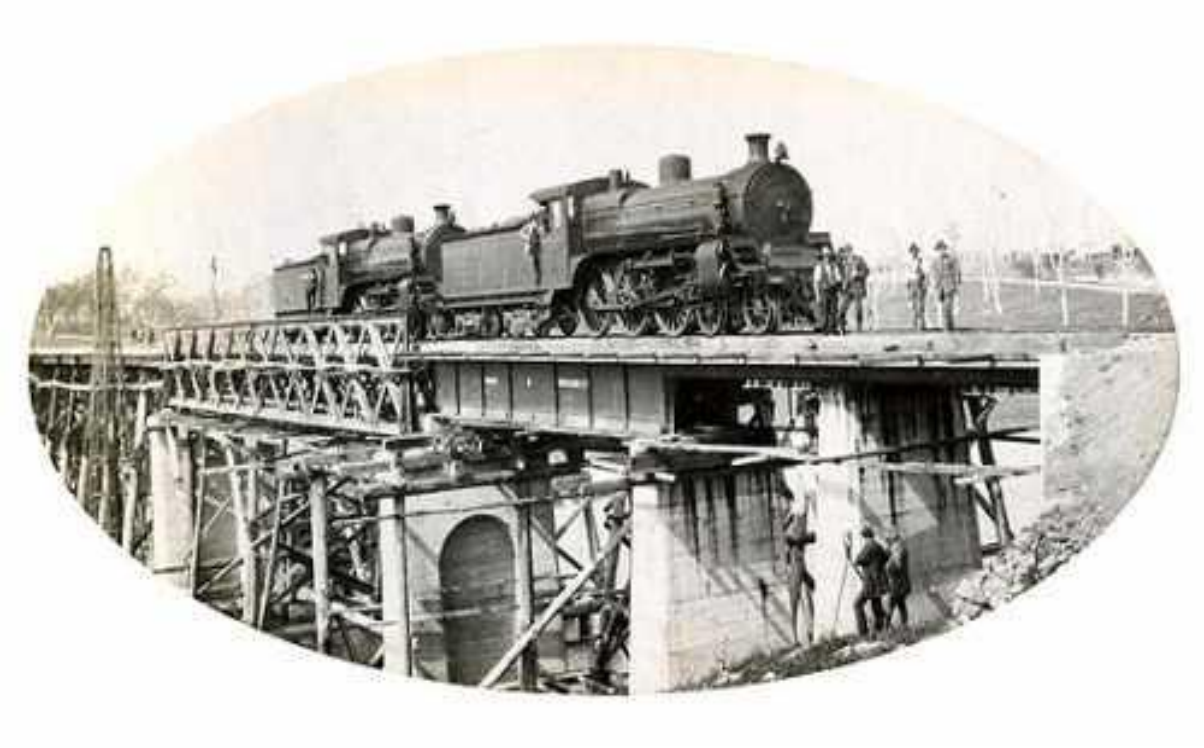


- **Railway Bridge under Construction, Bairnsdale, Circa 1915.**

- **Description:** A Railway Bridge under Construction.
- **Location:** Bairnsdale, Victoria, Australia
- **Date:** Circa 1915

- **Subjects:** Horses, Bridges, Building And Construction, Construction Workers

- **Collection:** The Biggest Family Album In Australia
- **Collection Number:**4419
- **Medium:** Negatives - Copy
- **Source:** Museum Victoria
- **Record No.:** MM004418



- **“Bairnsdale to Orbost. Bridge over Nicholson River. 1915. Test with two A2 117t Locos.**

- **Inscription:** Bairnsdale to Orbost. Bridge over Nicholson River. 1915. Test with two A2 117t Locos.
- **Description:** The two A2 class 117t steam locomotives are stopped on the bridge. Timber staging is still in place beneath the centre truss and the far side of the bridge is of timber construction. There is a pile driving derrick on the left. Two men with a theodolite on a tripod stand on the bank on the right. They are measuring deflection of the bridge under. A riveted steel plate girder in the foreground bears the name "Johns & Waygood Ltd."
- **Location:** Bairnsdale, Victoria, Australia
- **Date:** 1915

- **Other Names:** Victorian Railways; Nicholson River
- **Subjects:** Bridges, Rivers, Scaffolding, Bridge Construction, Steam Locomotives, Theodolites, Pile-Driving Derricks

- **Collection:** Charles H. Perrin Album
- **Collection Number:**67
- **Medium:** Albums - Photographs
- **Source:** Museum Victoria
- **Record No.:** MM069312”

- **Bairnsdale to Orbost. Bridge over Nicholson River. 1915 Coffer Dam - Pier 4.**

- **Inscription:** Bairnsdale to Orbost. Bridge over Nicholson River. 1915 Coffer Dam - Pier 4.
- **Description:** There is coffer dam used in the construction of Pier 4 on the left while a pile-driving derrick on the right is working on foundations for Pier 3. A rail truck is on the temporary timber bridge behind. There are many dead trees. The Nicholson River Bridge was on the Bairnsdale to Orbost line.
- **Location:** Bairnsdale, Victoria, Australia
- **Date:** 1915

- **Other Names:** Victorian Railways; Nicholson River
- **Subjects:** Bridge Construction, Concrete Laying, Coffer Dams, Lifting Equipment

- **Collection:** Charles H. Perrin Album
- **Collection Number:**78
- **Medium:** Albums - Photographs
- **Source:** Museum Victoria
- **Record No.:** MM069314

- **Bairnsdale to Orbost. 1915 Boggy Creek Bridge.**

- **Inscription:** Bairnsdale to Orbost. 1915 Boggy Creek Bridge.
- **Description:** The completed Boggy Creek Bridge consists of a riveted steel plate girder main span over concrete piers with RSJ (Rolled Steel Joists) approach spans on concrete piers at either end. Three of the timber approach spans The Boggy Creek bridge was on the Bairnsdale to Orbost line.
- **Location:** Bairnsdale, Victoria, Australia
- **Date:** 1915

- **Other Names:** Victorian Railways; Boggy Creek
- **Subjects:** Bridges, Creeks, Huts, Railway Signals

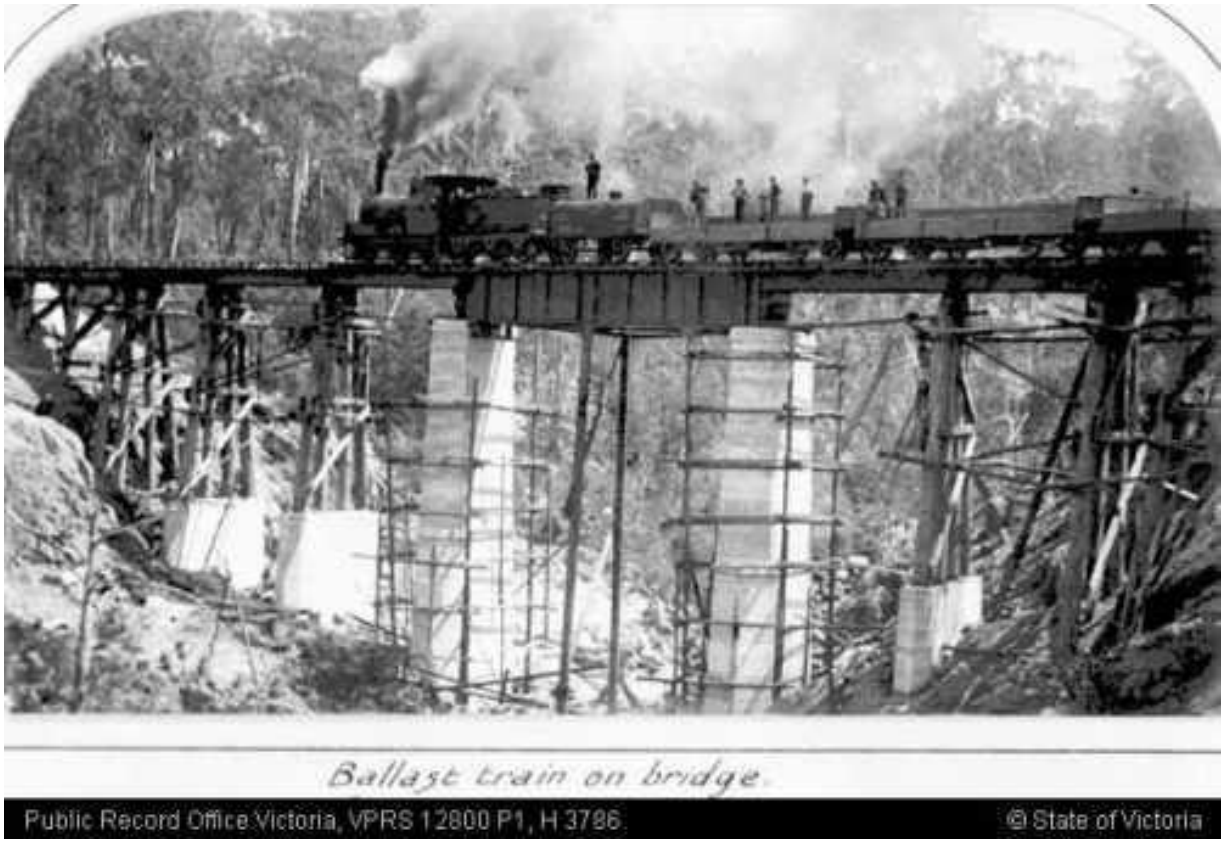
- **Collection:** Charles H. Perrin Album
- **Collection Number:**75
- **Medium:** Albums - Photographs
- **Source:** Museum Victoria
- **Record No.:** MM069322

- **“Combined Road & Railway Bridge over Snowy R. at Orbost, 1921**

- **Inscription:** Combined Road & Railway Bridge over Snowy R. at Orbost, 1921
- **Description:** View of four timber piers of the combined road/rail bridge over the Snowy River at Orbost during its construction in 1921. The piers are connected by a cable supported walkway. Erection of the RSJ (rolled steel joist) and riveted steel plate girders for the western approach spans has begun from an embankment on the left. The Snowy River Bridge was on the Bairnsdale to Orbost line.
- **Location:** Orbost, Victoria, Australia
- **Date:** 1921

- **Other Names:** Victorian Railways; Snowy River
- **Subjects:** Piers, Piles, Footbridge, Rivers, Bridge Construction

- **Collection:** Charles H. Perrin Album
- **Collection Number:**96
- **Medium:** Albums - Photographs
- **Source:** Museum Victoria
- **Record No.:** MM069382”



- Ballast Train Boggy Creek Bridge between Bairnsdale and Orbost, 1915
- Link to digitised item http://wiki.prov.vic.gov.au/index.php/VPRS_12800_P1_H_3786

- McLeod, Mona Catherine c.1898-1964, photographer.
- View of Orbost Railway, taken in January 1933.
- Date(s) of creation: May 4, 1933. Photograph printed in May 1933 from original negative taken in Jan. the same year.
- Photograph: gelatine silver; 12.0 x 16.5 cm.
- Reproduction rights owned by the State Library of Victoria
- Accession No: H19196
- Image No: b52137

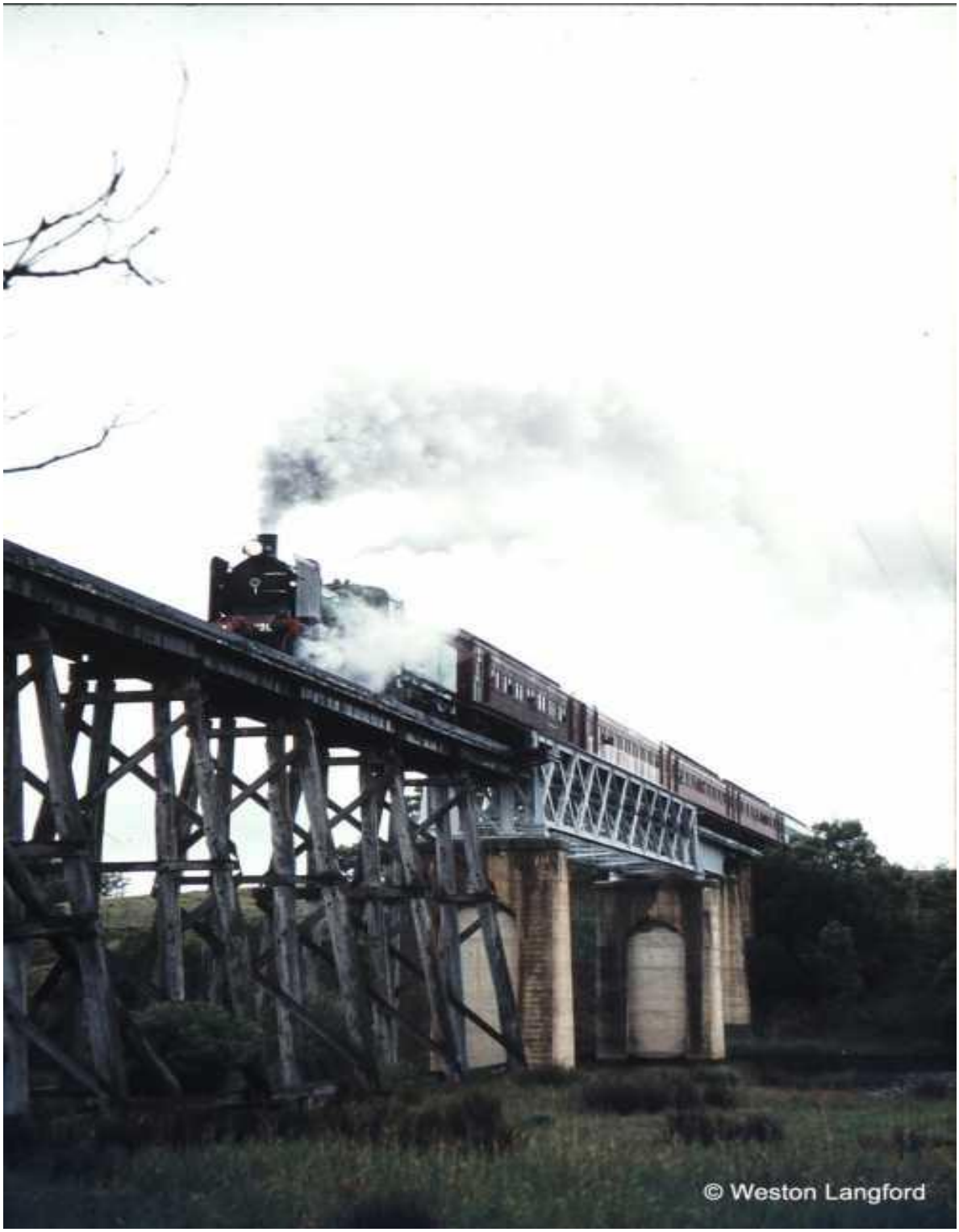
- Orbost. Narrow gauge railway line [picture] B5
- Author/Creator: Herbert Percival Bennett photographer.
- Date: ca. 1935-1939
- Description: 2 photographs: gelatine silver stereograph; 7.3 x 7.5 and 7.3 x 7.3 cm. on stereo card 8.8 x 17.8 cm.
- Copyright status: This work is out of copyright
- Terms of use: No copyright restrictions apply.
- Identifier(s): Accession no(s) H88.24/44
- Notes: Title inscribed in black ink on verso.
- Series/Collection: Views of Mt. Buffalo, The Grampians, Orbost, Gippsland, Corryong, Lakes Entrance, Portland and Ballarat.
- Link to digitised item: http://handle.slv.vic.gov.au/10381/359522
- Link to this record: http://search.slv.vic.gov.au/MAIN:SLV_VOYAGER1710037
- Collection owner: State Library of Victoria.

- Orbost September 1975 _ Flickr C1
- T412 on Special tour pass
- Taken by Rodney Gaulke
- Link to digitised item: https://www.flickr.com/photos/58476760@N05/6981291961

- T412 on Up tour special at Stony Creek on the 14 September 1975
- Taken by Rodney Gaulke
- Link to digitised item: https://www.flickr.com/photos/71914671@N03/8574277588/in/photostream

- **Nicholson River Bridge Looking West**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114596.jpg

- **Bruthen down ARHS-ARE Special at platform**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114599.jpg
- Image by: Weston Langford



- **114598: Nicholson River Bridge down ARHS-ARE Special K 190**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114598.jpg
- Image by: Weston Langford

- **Mile 192.25 Orbost Line down ARHS-ARE Special K 190**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114600.jpg
- Image by: Weston Langford

- **Mile 205 Orbost Line Stony Creek Bridge Down ARHS-ARE Special K 190**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114602.jpg
- Image by: Weston Langford

- **Nowa Nowa upside Down ARHS-ARE Special K 190**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114611.jpg
- Image by: Weston Langford

- **Snowy River Trestle down ARHS-ARE Special K 190**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114617.jpg
- Image by: Weston Langford

- **Orbost Down ARHS-ARE Special K 190**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114618.jpg
- Image by: Weston Langford

- **Nowa Nowa T 396 and Up ARHS-ARE Special K 190**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114627.jpg
- Image by: Weston Langford

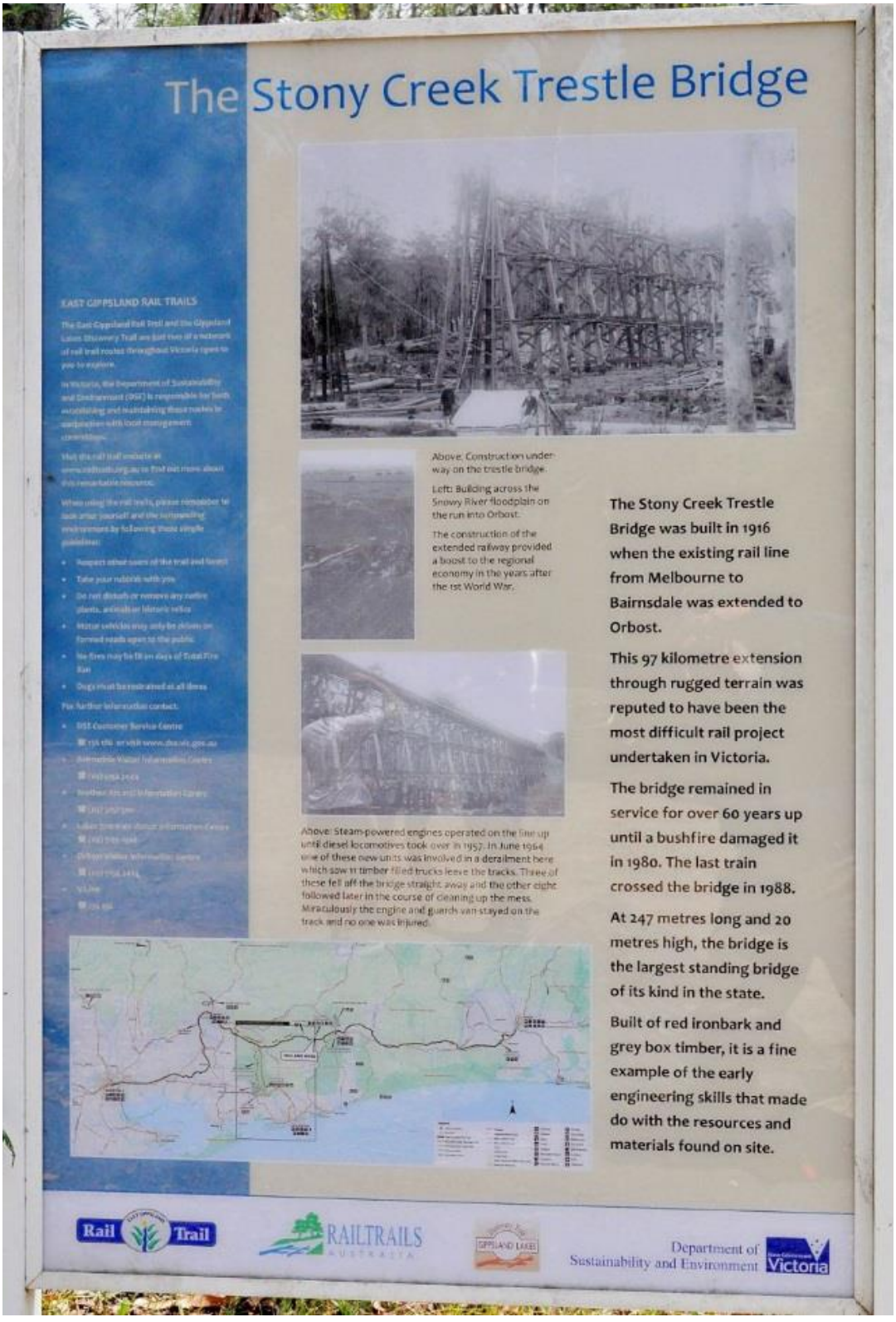
- **Orbost K 190 ARHS-ARE Special**
- Date Taken: 17 October 1981
- Link to large image: /media/photos/114622.jpg
- Image by: Weston Langford

- Snowy River Floodplain Viaduct overlook at Western End.
- Taken by Owen Peake, December 2015.

- Snowy River Floodplain Viaduct Orbost.
- Taken by Owen Peake, December 2015.

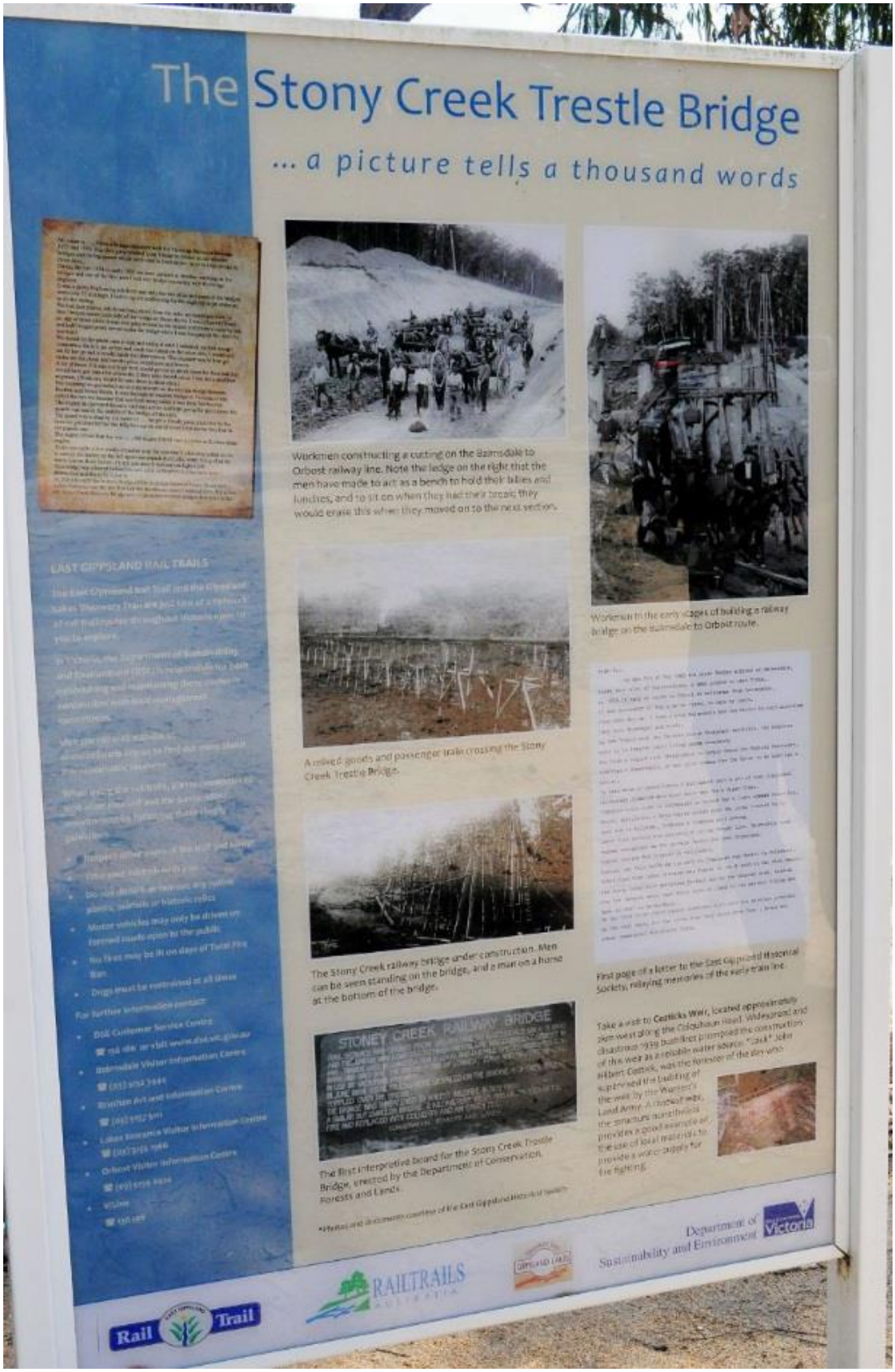
- Stony Creek Viaduct South of Nowa Nowa
- Taken by Owen Peake, December 2015.

Nothing remained from Hospital Creek Bridge except twisted metal. Taken by Owen Peake, December 2015.



Existing Interpretation Panel at Stony Creek Car Park.

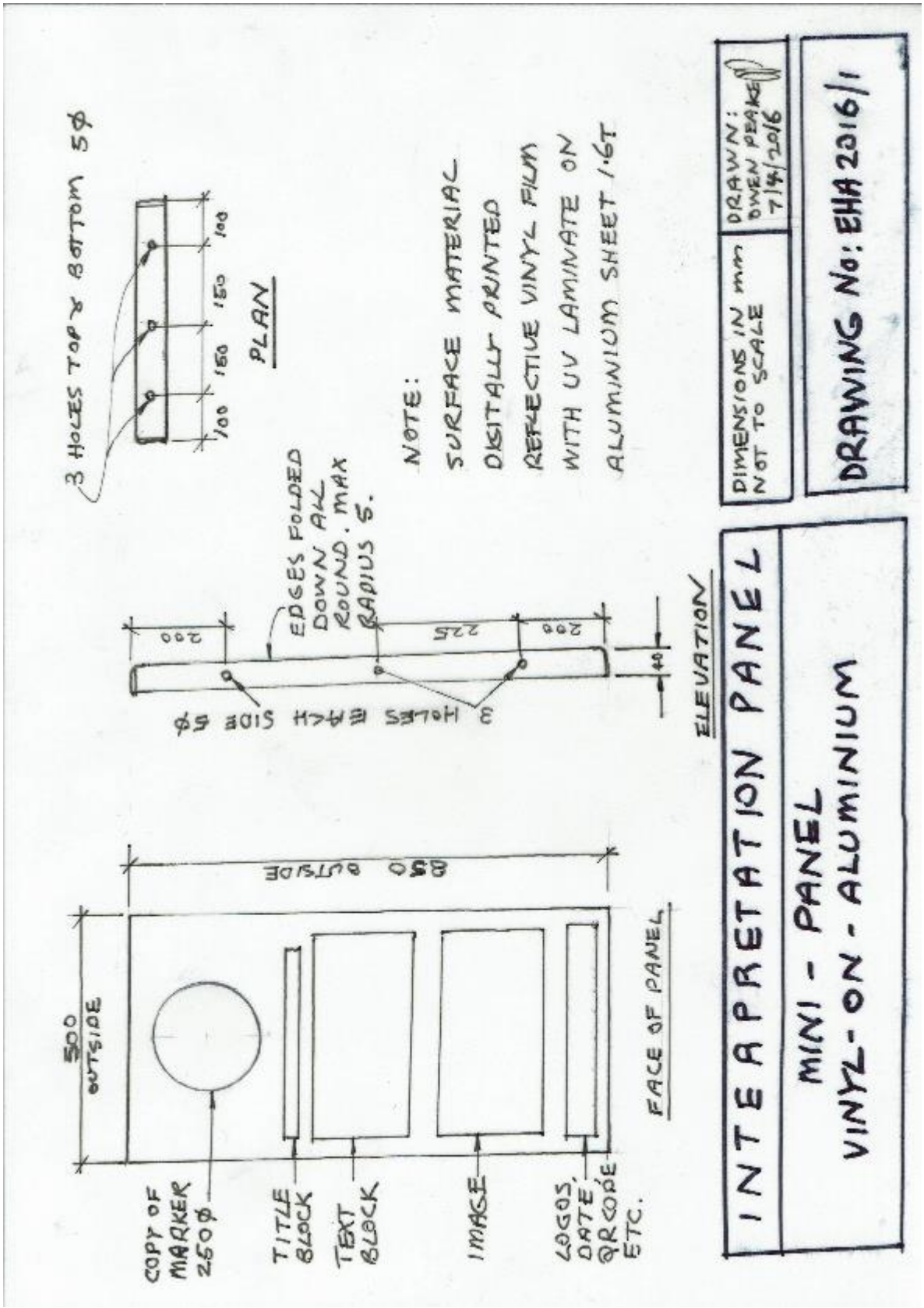
Image: Owen Peake

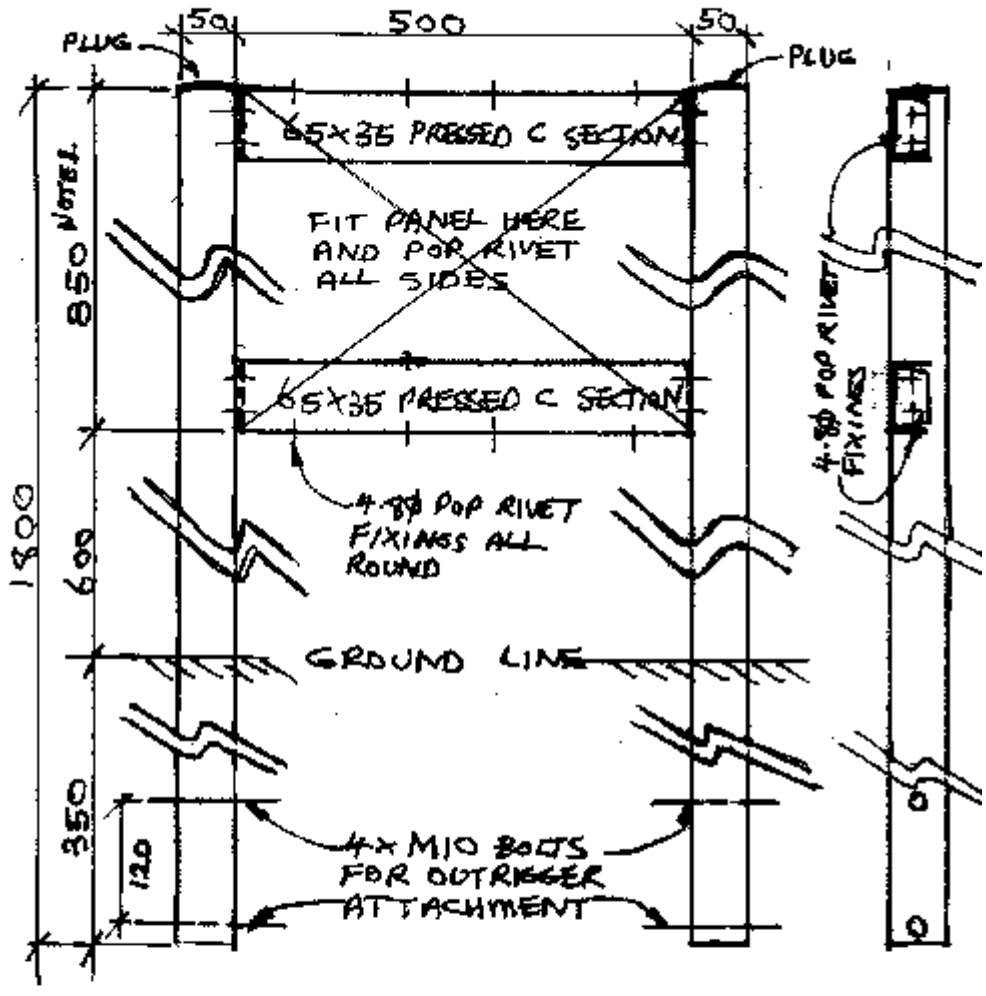


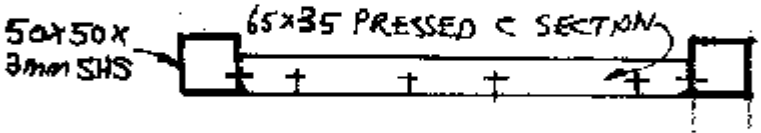
Existing Interpretation Panel at Stony Creek Eastern Overlook (proposed ceremony site).

Image: Owen Peake

Appendix 8: Drawings of Proposed Mini-Panel







INTERPRETATION PANEL FRAME
ELDORADO GOLD DREDGE

DRAWN: OWEN PEAR
DATE: 24/9/2015
DIMS IN mm
N.T.S.

NOTE 1: ADJUST THIS DIMENSION TO SUIT AFTER TEST FITTING PANEL

Authorship, Acknowledgments and Notes

Document written by:

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Joemar Pajar, Civil Engineering student, Victoria University, Footscray Campus, 2015.

Pooria Janghorban, Civil Engineering student, Victoria University, Footscray Campus, 2015.

Acknowledgments:

We would like to thank all the members of the community who helped provide information regarding the Bairnsdale to Orbost Railway Line, without their guidance this nomination would not be possible.

We would like to thank these members specifically for their contribution and time; Michael Oxer, for accompanying us during our site visit and showing us the benefits of the East Gippsland Rail Trail; Helen Martin, for providing us with historical information; Brian Gustus for the informative tour of the area and May Leatch for providing additional information.

Notes:

This document has been written under the general guidance of the Style Manual for authors, editors and printers, Commonwealth of Australia, Sixth Edition, Published by John Wiley & Sons Australia Ltd, Revised by Snooks & Co, 2002.

The method of citation used in this document is the Vancouver System. See page 190 of the above Style Manual.

For those not familiar with the term **Rail Trail** the following explanation may be useful.

Rail Trails are usually built on the abandoned civil engineering formations of railway lines which have been closed down and are no longer needed for railway purposes. A well graded gravel or bitumen track is built where the rails were located and the facility is made available to be used by walkers, bicycle riders and horse riders but not by any form of motorised transport. Additional facilities may be added to the rail trail such as picnic areas, seats, shelters etc. The old level crossings are used to provide the safest possible crossings over roads, with appropriate signage.

Change Control

VERSION 1	**1 FEBRUARY 2016**		**ORIGINAL DRAFT**
VERSION 2	**6 FEBRUARY 2016**	**21414 WORDS**	**OP ADDED CHANGE CONTROL EDITS 2-5 FEBRUARY**
VERSION 3	**17 FERBURARY 2016**	**22160 WORDS**	**Further Drafting, Added Operations and Locomotives**
VERSION 4	**20 FEBRUARY 2016**	**26800 WORDS**	**Further Drafting, Added more section in the Appendix**
VERSION 5	**28 FEBRUARY 2016**	**28265 WORDS**	**OP ADDED CHANGE CONTROL EDITS 28 FEBRUARY**
VERSION 6	**3 MARCH 2016**	**29011 WORDS**	**Further Formatting, Added railway map and reference list. Incorporated action on comments on Version 5 by OP on 29 Feb 2016**
VERSION 7	**7 MARCH 2016**	**29011 WORDS**	**MINOR CHANGES BY OP**
VERSION 8	**7 APRIL 2016**	**29358 WORDS**	**REVISION OF HERITAGE LISTINGS AND ADDITION OF APPENDIX 8 BY OP**
VERSION 9	**13 APRIL 2016**	**29343 WORDS**	**CHECK READ, CHECKED FOOTNOTES, CHECKED TABLE OF CONTENTS**
VERSION 10	**27 APRIL 2016**	**29487 WORDS**	**ADDED NOTE ON RAIL TRAILS AT p136**
VERSION 11	**6 MAY 2016**	**29563 WORDS**	**MODIFIED OWNERSHIP OF RAILWAY**